HORSELESS AGE The oldest automotive paper published in the English language has been purchased by The Class Journal Co. Its engineering features, and a part of its circulation, have been merged with AUTOMOTIVE INDUSTRIES

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The AUTOMOBILE

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No. 2

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JUL 15 1918

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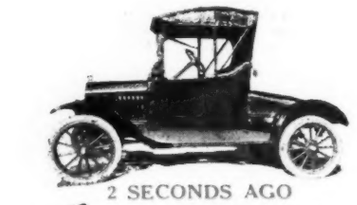

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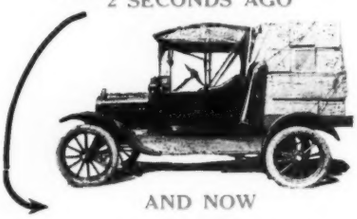

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XXXIX NEW YORK—THURSDAY, JULY 11, 1918—CHICAGO NO. 2

Steel Shipments Can Be Made Without Priority Certificates

War Industries Board Reclassifies Consumers, Allowing Makers of Cars, Trucks and Tractors Sufficient Steel to Complete Present Production

New Steel Arrangements

Classification of steel consumers allows shipments to certain consumers without priority certificates or written approval from War Industries Board.

Jobbers in steel and steel products will be allowed to maintain and replenish stocks.

Consumers ordering not more than 5 tons of steel in the aggregate will secure delivery regardless of their classification.

Exports of steel and iron products will be supervised by War Industries Board. The steel and iron will not be shipped to the manufacturers for construction into products for export except by written approval.

By Allen Sinsheimer

WASHINGTON, July 9—Shipments of steel and pig iron can now be made to certain consumers without priority certificates or written approval from the War Industries Board under a new classification plan just arranged.

The trend of the new scheme inaugurated by the Board marks a relaxation from the strict steel control it has supervised in the last 60 days. It appears that the forecasts made by the steel industry that the War Industries Board would learn that the Government does not require the entire steel output for war work are true. Apparently steel production is greatly in excess of Governmental steel requirements.

There are five classifications of consumers, including, according to unofficial version:

Class AA, A and B—Ships, including destroyers and submarine chasers; aircraft; munitions; fuel for military, naval and domestic consumption and for war factories.

Class C—Railroads and other necessary transportation equipment; public utilities serving war industries, army, navy and the civilian population; clothing for civilian population; fuel for food, clothing and like industries; tools, implements, utensils and equipment required directly or indirectly for food production, completion and preservation.

Class D—All industries and products not included in the above.

Making public the classification scheme, the Board declined the request of AUTOMOTIVE INDUSTRIES to outline either the above classifications or the posi-

tions of automotive products as told below, officially, but in interviews indicated that these classifications and positions would be approximately correct.

The positions of the automotive products under the new classification will be:

Classes AA, A and B—Airships; passenger cars for war purposes; trucks for war purposes; motorcycles for war purposes; military tractors.

Class C—Farm tractors; commercial trucks; passenger cars partly finished and requiring only a minimum of parts for completion; passenger car factories performing considerable war work where it is desirable to maintain that part of the organization making passenger cars; motorcycles.

Class D—Passenger cars not strictly for utilitarian purposes or not specified in the above classifications.

Priority certificates will be issued by the director of steel supply, War Industries Board, to classes AA, A and B, indicating that these are of the utmost importance and will receive first consideration.

Producers of steel and pig iron can ship these commodities to class C consumers without priority certificates or written approval. They are allowed by the War Industries Board's instructions to ship to class C consumers not only after priority certificates are filled, but at any time such deliveries do not interfere with the filling of priority certificates. It is anticipated that this arrangment will insure adequate steel supply to all class C consumers.

Orders not exceeding 5 tons in the aggregate for class D consumers can be filled by producers without written approval from the Board provided these shipments are reported monthly with a statement that the orders were filled in the public interest. Orders from class D consumers for more than 5 tons must first be approved by the War Industries Board.

Procedure for Manufacturers

The surest plan for all manufacturers to pursue, if not in classes AA, A or B, is to assume that they are in class C and apply for their full steel and pig-iron requirements from the producers on that basis. If they are unable to secure their needs through this plan or cannot find a producer or manufacturer who will accept the order, application for allotment should be made to the Director of Steel Supply and should be supported by strong evidence in writing that the public interest requires that such orders be placed and filled.

Purchasers of steel under class C rating should not apply to the War Industries Board so long as reasonably satisfactory delivery is secured. They should apply for their requirements only to the steel producers. Class D consumers should apply only to the producers and manufacturers of steel and pig iron, who will in turn, when the orders amount to more than 5 tons, mail such applications in duplicate to the War Industries Board for approval.

Discussing the classification of passenger cars it was said that all such applications for steel or pig iron when not in class C or higher will be considered on their respective merits. The extent of loss, the quantity of steel needed, the conversion possibilities of the factory will be taken into consideration.

According to some officials of the War Industries Board a plan is now under consideration whereby steel will be supplied to all passenger car manufacturers under a license plan under which they will be allowed to make and sell passenger cars for solely utilitarian purposes. The plan is at this time very vague in the minds of those conceiving it.

They are considering some method by which the consumer would supply a certificate testifying to the uses planned for the car he desires to purchase. If some such plan can be successfully operated it is expected that the manufacture of the great bulk of passenger cars, which goes to the farmers, doctors, contractors and other businesses and professions, will be continued.

Requirements for Jobbers

Jobbers of farm tractors and similar commodities will be allowed to maintain and replenish their stocks, but must observe the essential minimum in placing orders. They must sign a pledge to prevent hoarding, and to sell their stocks only for essential uses. They must exact similar pledges from their customers. By meeting these conditions they will be assured prompt shipments by the makers and will be given priority ratings by the War Industries Board.

The jobbers dealing in plates, sheets, bars and shapes, structural shapes, farm implements, tubular products, wire and wire products, tin plates, heavy hardware, farm implements, mining tools, machinery and equipments, oil well supplies and similar products will operate under the following plan in the maintenance of their stocks:

Each jobber will file before the 5th of each month with the director of steel supply, War Industries Board, a certified statement covering shipments made during the preceding month. Forms will be furnished for the statements by the War Industries Board.

To the extent that such shipments fall within classes AA, A, B or C as defined above or by permits issued by the director of steel supply, the jobber will be entitled to rank with the manufacturer and secure priorities for the replacement of shipments so made, provided that the total tonnage ordered for replacement will not be in excess of the amount shipped during the previous month.

Manufacturers will be expected to scrutinize all orders from jobbers to guard against hoarding.

Must File Pledge

All orders placed in accord with the above rules will be rated as class B-4 and entitled to class B priority and precedence, providing the jobber placing the order has filed with the priorities committee and the director of a steel supply, War Industries Board, a pledge in writing as follows:

> *"I do hereby pledge myself not to use or so far as lies within my power permit the use of any stocks now in or which may hereafter come into my possession or control, save*

"(1) *for essential uses as that term may be defined from time to time by the priorities division of the War Industries Board, or*

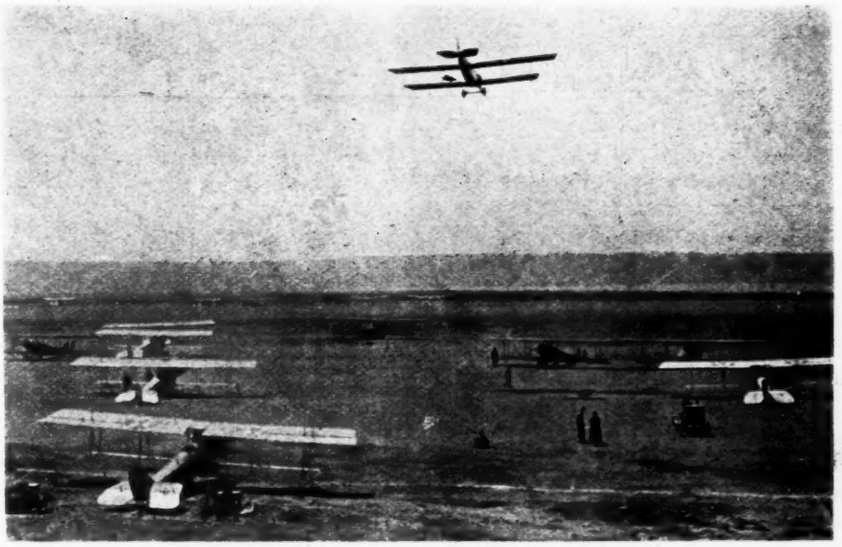
"(2) *under permits in writing signed by the director of steel supply; that I will make no sale or delivery from such stocks to any customer or retailer before his filing with me a similar pledge in writing; and that I will use my utmost endeavor to prevent the hoarding of stocks and to insure that they be distributed solely for essential uses.*"

When this pledge has been once filed the jobber should certify this fact on each order when placed with the manufacturer. Manufacturers will not accept orders without such certification.

No applications for licenses to export iron or iron and steel products should be made of the War Trade Board (except on direct orders of the U. S. Government and its Allies) unless the orders are (1) covered by priorities certificates Classes AA, A or B or (2) covered by a permit signed by the director of steel supply. This ruling does not indicate that the steel division of the War Industries Board has usurped the duties of the War Trade Board and will control all exports. It does mean that wherever an article or commodity which would ordinarily fall in class C for consumption in this country, such article or commodity will fall into class B if manufactured for export and the manufacturer will lose his preferential class C rights. Before he secures the steel for manufacture of an article of iron or of iron and steel for export, he must secure a permit from the director of steel supply just as if he were in class B.

Two New Features of Airplane Development

A new English Sopwith combat plane, built on the same principle as the French Spad



A general view of the new Rockwell Aviation Field, San Diego, Cal.

First American-Built Handley-Page Plane Launched

At Ceremony, Ryan Praises Work of His Predecessors, Howard Coffin and Colonel Deeds—Says Liberty Engine Is "Best Ever Built"

ELIZABETH, N. J., July 8—At the launching of the first Handley-Page bombing plane constructed in this country at the plant of the Standard Aircraft Corp., John D. Ryan, head of the Aircraft Production Board, paid a generous tribute to the work of his predecessors, undoubtedly meaning Howard E. Coffin and Col. Deeds, and pronounced the Liberty engine "the best and most powerful aeronautical engine ever built."

With regard to the work of those who had preceded him in charge of the Government's aircraft building program, Mr. Ryan said:

"Much good work has been done by my predecessors, and I am taking this opportunity to assure the people of the country that, in my opinion, there has been no such delay with the work or anything like such incapacity of those in charge as has been indicated in some of the criticism of the accomplishments, or lack of them, in production. A few facts will, I think, bear me out.

"In the fifteen months we have been at war here has been designed and put into production the Liberty engine, which is acknowledged by all of the Allies as a great performance and a distinct contribution to the cause. As a powerful machine to drive heavy aircraft, it is undoubtedly as satisfactory as any engine produced by any nation on either side of the war. There were produced here in our workshops during the months of May and June just passed as many of these engines as Great Britain produced of all types of aeronautical engines in the entire year of 1915, at the close of which she had been seventeen months at war. Including other types of aircraft engines, there were more produced in our shops in the month of June than Great Britain

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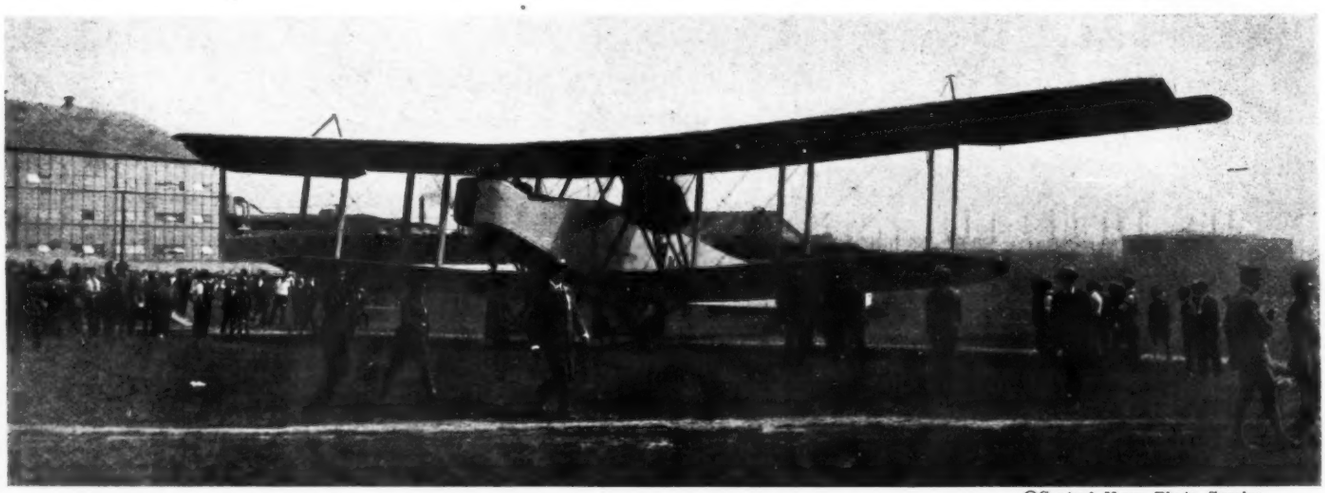

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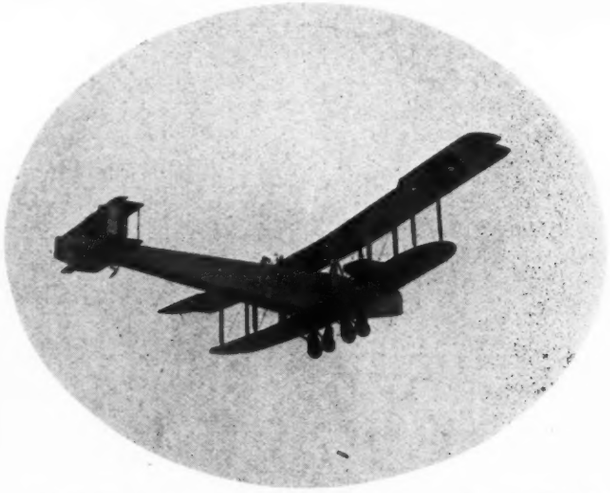
Many well-known persons attended the launching of the first bombing plane to be sent into the air in America. This took place at the plant of the Standard Aircraft Corp., Elizabeth, N. J.

The plane was christened "Langley" at its launching. Double machine guns are mounted at the nose



The "Langley" on its initial flight over the Jersey field after its launching

Distribution of Truck Weights

An Analysis of the Weights of Component Parts, Worked Out on a Percentage Basis, and Showing Variation of the Percentages with Truck Capacity

By P. M. Heldt

A STUDY of the distribution of weight among the components of a motor truck is of considerable interest. Heretofore we have not given very much attention to weight reduction in trucks, but if fuel and tires continue to increase in price it will assume a much greater importance in the future. As in other pieces of mechanism, the individual components of a truck should be nicely balanced against each other, so that each affords substantially the same degree of safety. The dimensions, and consequently the weight, of some parts are dependent upon the wear desired. In their case it is probably not correct to say that all should be designed for an equal life, as those parts which can be replaced quickly and at slight expense may well be made somewhat smaller, relatively, than others, the replacement of which is fraught with more difficulty and expense.

Motor truck components divide into two classes, one comprising all those which constitute a substantially fixed proportion of the weight of the complete truck, irrespective of the size or load capacity of the truck, and the other all those whose proportional weight varies with the capacity of the truck. In the following discussion the weight of the complete chassis, dry, is taken as 100 per cent.

Engine Weight Proportions

It is generally known that large trucks carry a relatively smaller engine than small trucks. From the load capacity standpoint, the large truck has a higher weight efficiency, that is, the proportion of useful load to dead load moved is higher, and, besides, the larger truck is geared down more and runs at lower speeds, consequently it does not need so powerful an engine. One well-known truck manufacturer in the past equipped a complete line with a single engine, depending upon the higher gear ratio in the larger trucks to move the heavier loads. This, of course, is an extreme case. In general the piston displacement of truck engines may be represented by a curve concave toward the horizontal axis, the curve tending to become horizontal as the larger capacities are reached.

Data used in this article are from twenty-one models of trucks ranging in capacity from ¾ ton to 5 tons. The data have been averaged, mean percentages being given where there appears to be no variation in the proportional weight with the capacity of the truck, and curves where there is such variation.

Frames appear to bear a substantially constant proportion to the total weight of the truck chassis, the figures obtained for the different trucks varying only within narrow limits. The average value is 10.6 per cent.

In springs there is a decided difference in the proportional weights at the ends of the list but nothing like uniformity of variation from one end to the other. This may possibly be due to the fact that small trucks are sometimes mounted on pneumatic tires and these may require less range of spring action and consequently less weight of spring material. Taking only trucks above 1½ tons load capacity, the proportional weight of the springs is not affected by the size of the truck. In this class all four springs together weigh 8.16 per cent of total weight of the chassis dry, whereas the springs of the trucks of 1½ tons and under weigh on the average 6.77 per cent of the total. The front springs in each case weigh much less than the rear springs. For eight models the front and rear spring weights were given separately, and for these the front springs made up an average of 26.6 per cent of the total spring weight.

The proportional weight of front axles does not vary materially with the load capacity of the truck. The front axles on the larger trucks are slightly heavier in proportion than those on the smaller sized trucks. Thus, if we take the axles on the 3½ and 5 ton models only, their mean proportional weight is 3.6 per cent of the whole, whereas the mean proportional weight of front axles of trucks of less than 3½ tons capacity is 3.13 per cent. For all of the trucks on which data were obtained the mean is 3.28 per cent.

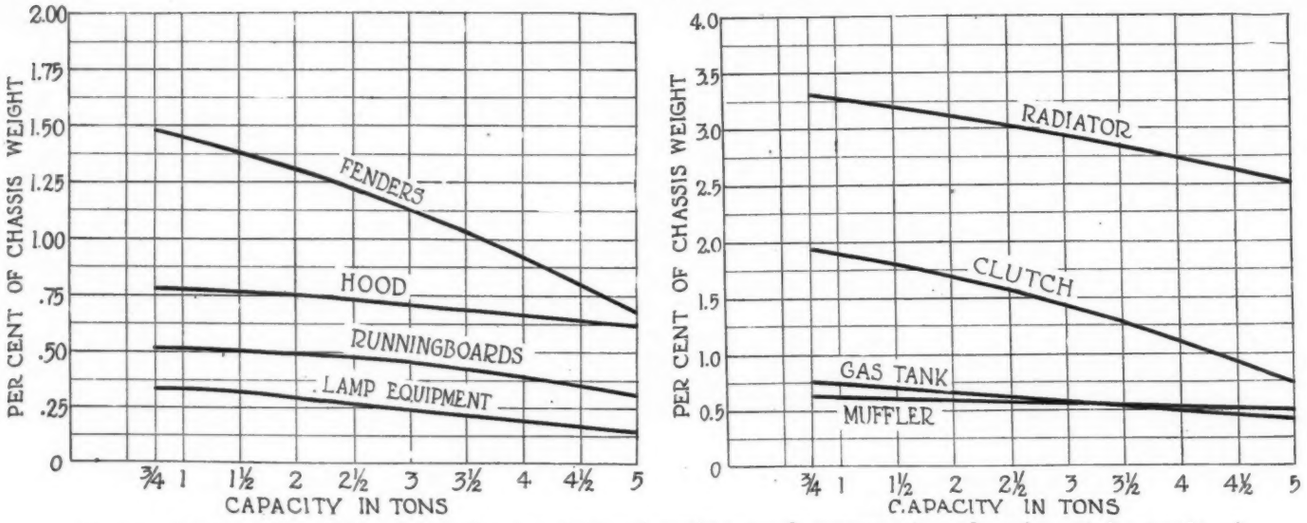
Rear axle weights show much the same characteristics as springs in that the percentage is materially smaller at the lower end of the load scale than at the upper, yet there is no steady increase from one end of the range to the other. Thus the average percentage for the three 1-ton models considered is 12.83, while that of the three 1½-ton models is 15.82, which is more than that of three 5-ton models, viz., 15.49. It must be remembered, of course, that rear axle designs vary a great deal, both as to the form of drive employed and as to the design of the axle housing which makes up the greater part of the weight. The great majority of the trucks considered have worm drive, however. In the curve an attempt is made to average all the figures, and a gradual increase is shown.

Steering Gear and Radiator Weights

Steering gear weights are proportional to chassis weights throughout. The lowest figure is 1.11, the highest 1.50 and the mean 1.37 per cent.

Radiators make up a smaller proportion of the weight of large than of small trucks. This is what might be expected, since the size of engines does not go up in proportion to truck capacity, while the size of the radiator must be roughly proportional to the size of the engine. The variation of the percentage weight is shown by one of the curves.

Engine proportional weight shows the most pronounced decline with an increase in truck capacity of all the large items considered. The one ¾ ton truck listed has an engine weight equal to 17 per cent of the chassis weight, which is substantially the same figure as found in passenger cars. On the other hand one of the 5-ton trucks has an engine proportional weight of



Curves showing the relative proportional weights of various truck components and equipment for trucks of different capacities

8.77 per cent and the mean value for all four 5-ton models is 9.75 per cent. Variation of the proportional engine weight with load capacity is shown by a curve.

The friction clutch is not always a distinct part, and it is therefore hardly warranted to expect close agreement between proportional weights of this part on different trucks. For those trucks for which the clutch weights were given the mean percentage value is 1.40. There is apparently a slight decline in the percentage with an increase in the size of the trucks, but the values found are so irregular that it is difficult to see the nature of the variation.

Transmissions drop in proportional weight with an increase in truck capacity even more rapidly than engines. It is customary to use relatively heavy transmissions on motor trucks, for one reason because trucks are driven a good deal of the time on one of the lower gears and the gear wheels must be dimensioned for continuous service. Roughly, on a motor truck the transmission weighs about one-half as much as the engine. One of the curves shows the variation of proportional transmission weight with truck load capacity.

Front wheels, like the front axles on which they are mounted, show no perceptible variation in proportional weight with truck size. The average value for seventeen models is 7.35 per cent.

Rear Wheel Weights Vary Considerably

Naturally the total weight of a chassis is 100 per cent for both a large and a small truck, and as the percentage weight of a great many items, such as engine, transmission, radiator, fuel tank, etc., is less in the large truck than in the small one, there must be other items whose proportional weight is greater in a large truck. Chief among these is the rear wheels. As shown by the curve, the proportional weight of the two rear wheels with their brake drums, rims and tires is about twice as great in a 5-ton truck as in a ¾-ton truck. One reason for this is that the capacity of the rear tires must be in direct proportion to the weight on them when the truck is loaded, and practically all of the load rests on the rear wheels. The front wheels are very little affected by the load and therefore the proportional weight of the front wheels does not vary with the truck capacity. If the load was proportional to chassis weight then the proportional weight of the rear wheels need not vary with truck capacity, but this is far from being the case. Using round figures, a 1-ton truck weighs about 2 tons empty and when loaded may have 1 ton of dead load and 1 ton of useful load on the rear tires. A 5-ton truck, on the other hand, weighs only about 4 tons empty and when loaded may have 2 tons of dead load and 5 tons useful load on the rear tires. This brings out the reason why the rear tires must be proportioned in accordance with the load. The same applies to a certain extent to rear axles, as the load must be held up by the axle.

It might be thought that as the load has to be supported by the springs the proportional weight of the latter also should increase with the truck capacity. There is indeed a slight increase, as already shown, but this is nothing like as pronounced as the increase in the proportional weight of the rear wheels. One reason for this is that the necessary weight of springs depends on other factors besides the weight to be carried. The heavier trucks are slow speed vehicles and not as much spring compression under load needs to be allowed for as in a

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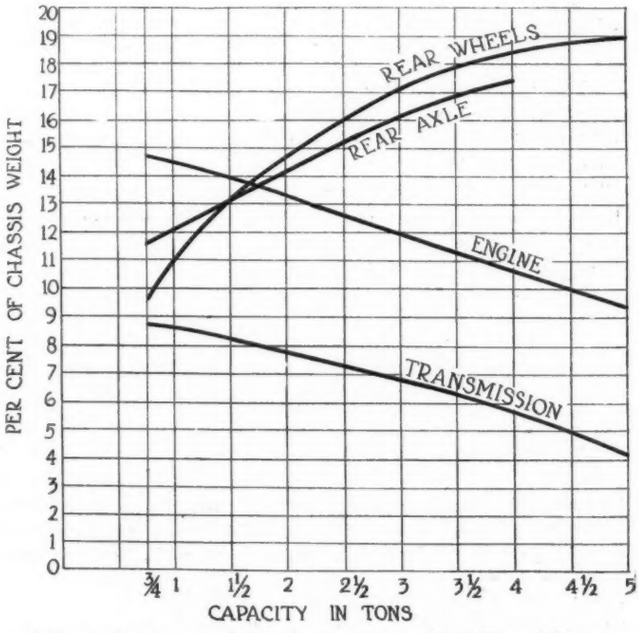


Axle and wheel weights increase considerably with any increase in the capacity of the truck

The Matter of Credit in Export Trade

Soundness of the Short Term Principle Which American Exporters Advocate —Open Credit vs. Time Acceptances—Adapting Methods to Product, Market and Buyer

By W. E. Tarlton*

MANUFACTURERS anticipating a permanent export business must decide upon some definite policy regarding credit. As a rule, there are three points to consider:

1—The product—If it is non-competitive the exporter may dictate terms and prices; if not, he must be governed very largely in these particulars by what others are doing.

2—The market—The rules of the markets of the world have been long established and are not easily changed for the convenience of the seller.

3—The buyer—He will consider a cash transaction last. He probably will expect credit.

It has been said, and rightly, that if a manufacturer would export at all, he must handle his credits in an intelligent way and along lines not fundamentally different from those employed in dealing with domestic trade.

American exporters have been harangued by writers of various creeds and tongues, even American writers, for their rigidity of terms, and, in contrast with them, mention has been made of the liberality of Germany. We, of course, have to-day our own ideas as to the extent of Germany's liberality. England and other exporting countries have been extolled and their praises sung. We have been told of their philanthropy, of their enterprise, of their investments made for pioneering enterprises with no desire for return except as a benefit to their country as a whole, but all of this is quite misleading.

True enough, in the experience of American exporters, it has been found that in many instances long terms have been granted and liberal credits extended by foreign manufacturers in these various countries, but an analysis of the situation will invariably show that these long terms and liberal credits have been extended only after careful investigation and after applying the same general rules that should always govern the extension of credit of any character.

Short Term Principle Fundamentally Sound

Even our so-called "American" cash terms are quite freely indulged in by our competitors in international trade, and more often than otherwise are demanded by them. Conservatism pervades the mind of every intelligent credit grantor, whether he learn it from an American business primer or from an English, French or Dutch. The short term principle which, I admit, is desired by every American manufacturer, is fundamentally sound, ideal, and, in fact, enviable, and the time is ripe for a forceful attitude toward short terms, especially in lines of quick turn-over possibilities, commodities, etc.

Up to the present time it has not been expedient nor necessary that we should place our goods in foreign fields on long terms or under a system of loose credit, in fact, it has not been necessary that we sell our goods to foreign countries at all except where it could be done on an extremely profitable basis, and long terms and long profit are not compatible unless they are accompanied by a mediator—long prices. Implicit faith in American business capacity and ingenuity prompts me to feel that we can and will overcome any and all competition, however, when once we have found it necessary to do so.

The manufacturing capacity of the United States has heretofore just about equalled our demand, but, of course, we are beginning to realize that there will be surplus production so soon as the high peak loads toward which we have been so fast climbing is reached. It is only caution, therefore, that prompts those who have analyzed this situation to begin now to prepare for the struggle for commercial supremacy which will surely follow that for military supremacy now being waged. That we, as exporters, are willing to grant credit is an irrefutable fact.

One hundred and forty-one representative firms were asked the question: "Are you granting credit to concerns located in countries other than our own?" One hundred and ten replied affirmatively, thirty-one only were insisting upon cash in every instance. Our American firms are as able to extend credit, or better able, in fact, than any competitor we have. We have the financial strength, and when the propitious moment arrives and a reasonably substantial basis for credit can be shown, we are perfectly ready to extend the necessary credit.

Importers of our goods, however, must know or be taught, if they do not know, that merchandise on credit costs more, that short terms are economical, sound and safe; that long terms and the pernicious abuses of credit which have been prevalent in some countries, should be wiped out at this, the most opportune time of all history.

Open Credit vs. Time Acceptances

Up to this time I have not attempted to differentiate between the term "open credit" and "time acceptances." Both are credit, one extremely hazardous, the other considerably less so. There are, of course, sound, honorable business men in every civilized country in the world and I, for one, deeply appreciate the truth of this, but these qualities are most loudly extolled by those whose close, first-hand knowledge and experience is not represented by many years of actual, open-credit relationship with merchants in foreign countries, and I mean it as no reflection upon these merchants when I warn against open credit. It is a policy only to be dealt with with eyes wide open and after a thorough investigation.

Open credit is based solely upon confidence. Confidence is the result of one's own or some one's else experience and should only be dealt in when you are familiar with the details of some such experience.

There will come times, in the experience of every exporter who does any volume to speak of, when he must extend open credit or lose profitable business, and in many cases, under any and all sorts of circumstances, and in most any country, some open credit can be extended with no more attending dangers than is average with any well-organized house, even though dealing exclusively with domestic trade.

We need badly further help from our enormously large financial institutions. They, at least some of them, have had the vision and are bending and lending every effort toward promoting the interests of American exporters. We need also serious study on the part of our legislature toward expansion of foreign trade interests, but, greater than all these, is the need that the mist of indifference and business apathy be removed from the eyes of our manufacturers that they may not only see the benefits that will accrue to them as individuals by a closer study of this vital issue, world's commerce, but that they may consider it a duty to interject their energies into it so that as a nation we may become a real factor.

*Abstract of a paper presented before the National Foreign Trade Convention.

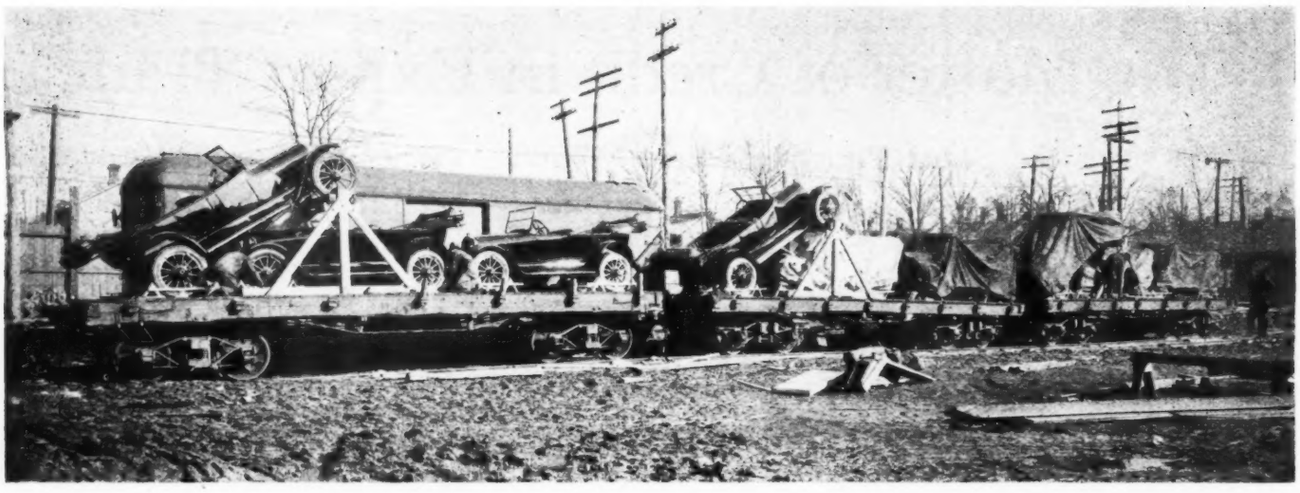


Fig. 1—Arrangement of cars for shipment on electric flat cars

New Methods of Loading Freight Cars

Schemes Devised for Loading Cars on Other Than the Regulation Automobile Type—Continental Motors Has Improved Shipping Facilities

By C. J. Shower

THE scarcity of freight equipment has made it necessary for the traffic departments of all car manufacturers to use their ingenuity in devising schemes for loading cars in the most efficient manner. There was a shortage of all kinds of freight cars. If the manufacturer could not get the regular automobile cars he was obliged to accept anything he could get if he wanted to dispose of the accumulating stock. With the supply of box cars very small, manufacturers were thankful to obtain flat cars, gondolas or any other type of car that was available—even cattle cars were used in many instances.

The use of other equipment necessitated a change in loading facilities. A number of companies borrowed the wrecking equipment of a railroad. By running this alongside a gondola it was a very simple operation to lift the passenger cars into it by means of the crane.

The Cadillac Motor Car Co. built its own lifting device. With the aid of chain hoists the cars are lifted off the ground and when above the sides of the freight car are pushed over it and lowered. Fig. 5 illustrates this. After two cars are deposited within the body of the gondola another one can be set on top as illustrated in Fig. 3. The cars are lifted on two iron bars which are hooked to the chains at each end, Fig. 4. Fig. 5 shows a car suspended in the air ready to be moved over the gondola and lowered.

The method of loading gondolas by the Dort Motor Car Co. is somewhat different. Runways are built up to the gondola and the cars are driven up on them. After two cars are thus placed upon the floor of the car, tracks of boards are made on top of them and another incline is built to connect with these tracks. Two more cars are then driven up and placed on boards above those on the floor, making a second tier of cars. Fig. 8 shows a car ready to start on the first incline, while the car in the distance has succeeded in climbing the second incline and is being fastened (Fig. 2).

Fig. 9 shows the method employed by the Olds Motor Works in loading flat cars. A rigid framework is built on a flat car, and boards placed at an angle of about 30 deg. form a track at each side upon which the cars may ride and be placed in position. It is possible to load four cars on a flat by this method; this is styled "end up" loading. Tarpaulins are thrown over the cars afterward

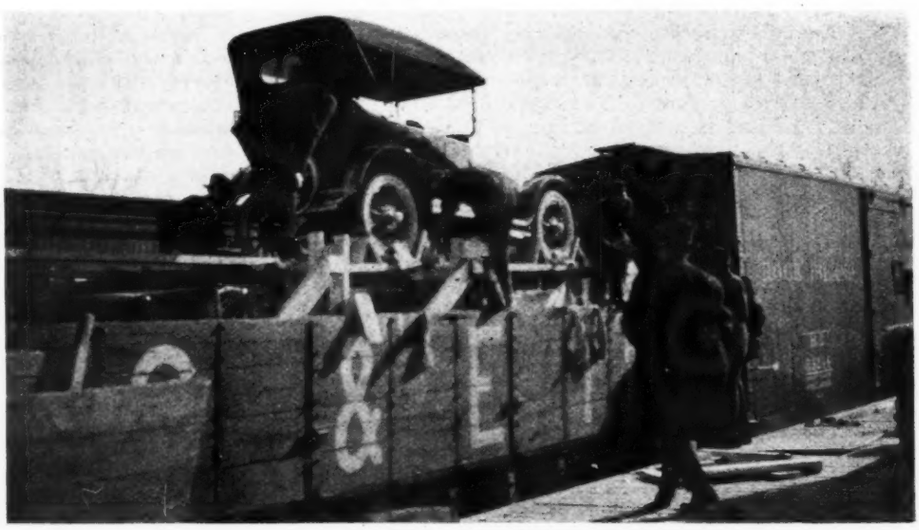
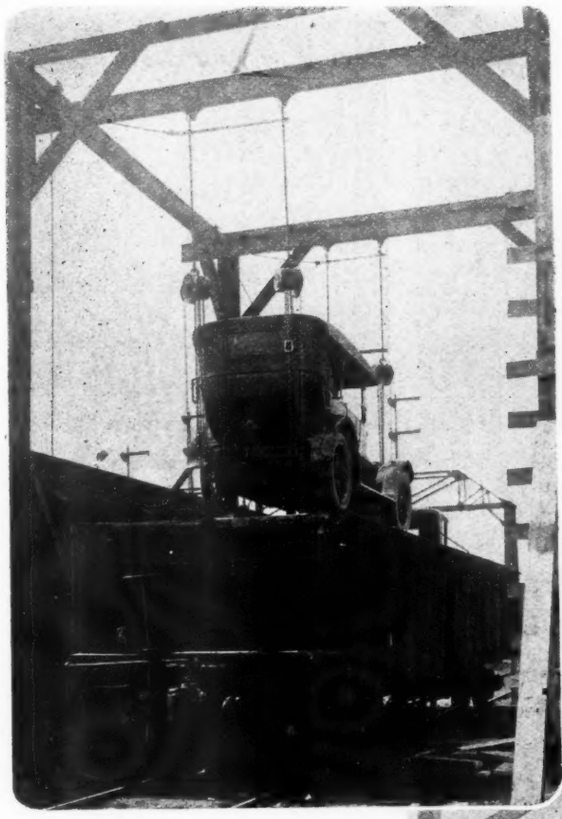
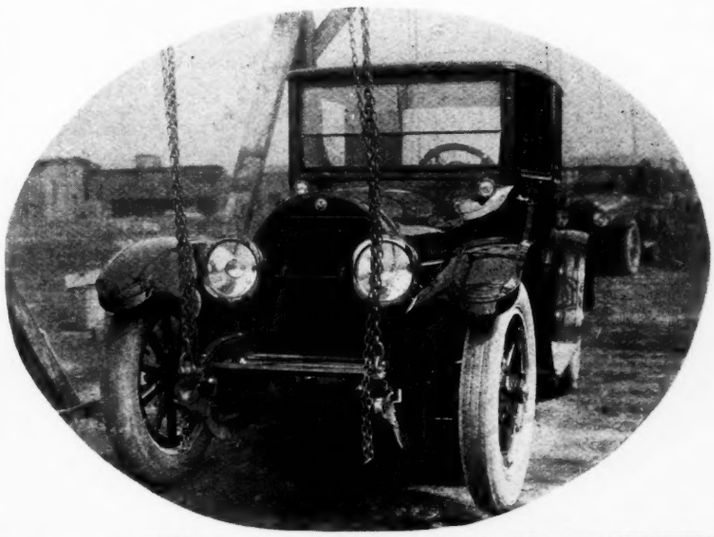
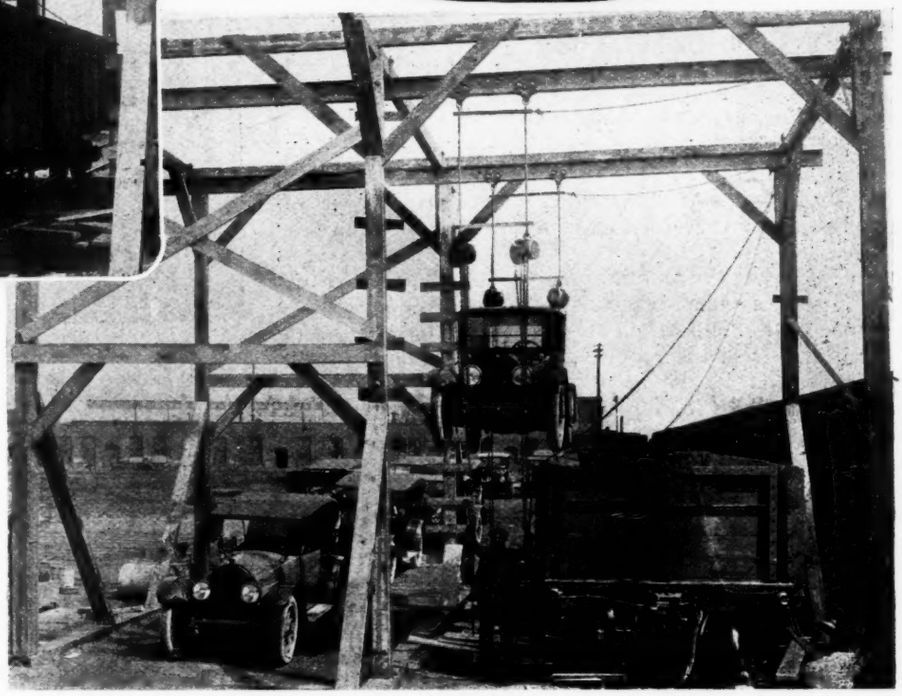


Fig. 2—Fastening the second layer of cars







Above: Fig. 3—The freight has just received the last of its quota. This gondola is carrying three cars; one is directly underneath the one that has just been placed and the corner of a coupe is seen immediately ahead. Upper right hand corner: Fig. 4—This illustrates the manner in which the car is lifted. On right: Fig. 5—The method of loading cars used by the Cadillac Motor Car Co., Detroit. A derrick is built to which the cars to be loaded are driven on the ground. One by one they are lifted with the aid of a chain hoist and swung into the gondola

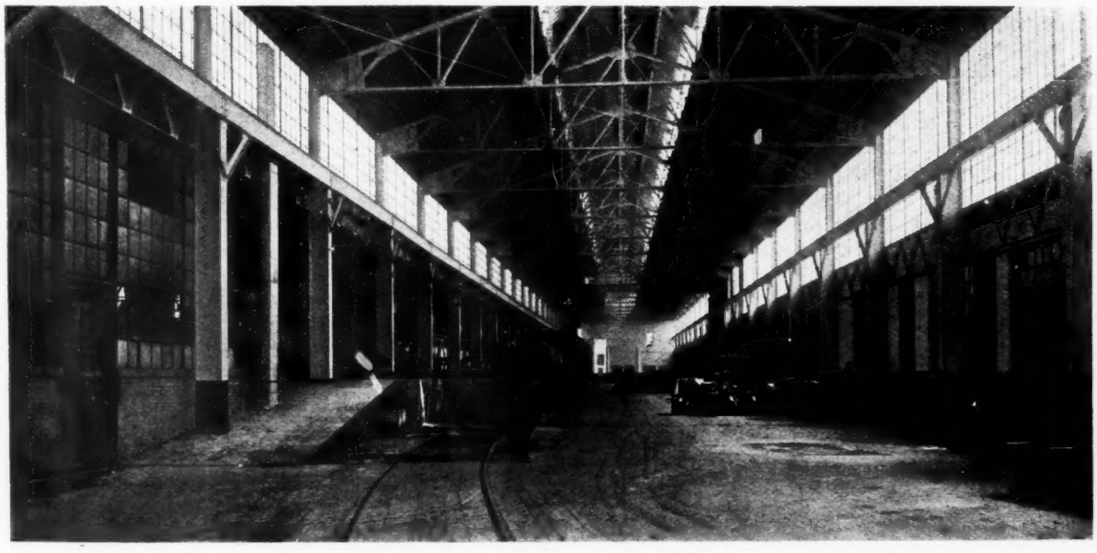


Fig. 6—Shipping at the Continental Motors Corp. is all handled under cover. The finished motors are loaded in the same cars that have just been emptied of their loads of rough stock without moving the freight cars

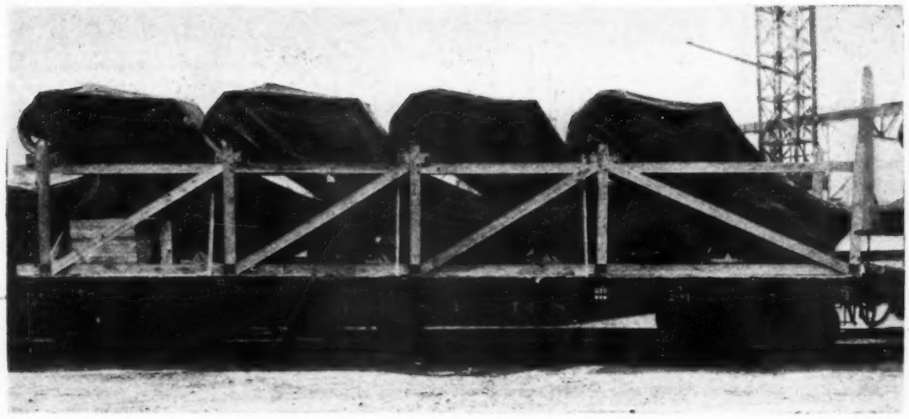


Fig. 7—Four Oldsmobiles, with their bodies properly protected, on a flat car ready for shipment

Fig. 8—The way the Dort Motor Car Co., Flint, loads its cars

to give protection from the weather and to exclude dust and dirt.

Fig. 1 shows loading on electric flat car equipment. Two cars are driven upon the flat and a third is raised on its rear wheels with the front ones propped up on a standard over one of the cars.

A feature of interest in the construction of the addition of the Detroit plant of the Continental Motors Corp., besides the fact that all handling of material is done under cover, and therefore may be carried on regardless of weather conditions, is that the incoming material is delivered directly from the cars to the various points in the machine shop, where it is turned over directly to the machines. This eliminates the necessity of trucking of material from the rough stores to the manufacturing department.

A crane in the test house is used in taking up the finished motors and placing them on the shipping platform alongside the railroad track, where they are loaded directly in the same cars which just previously brought in rough stock. This arrangement greatly expedites the handling of material, and makes it unnecessary to move the freight cars from the point of unloading raw materials to the receiving of the finished product.

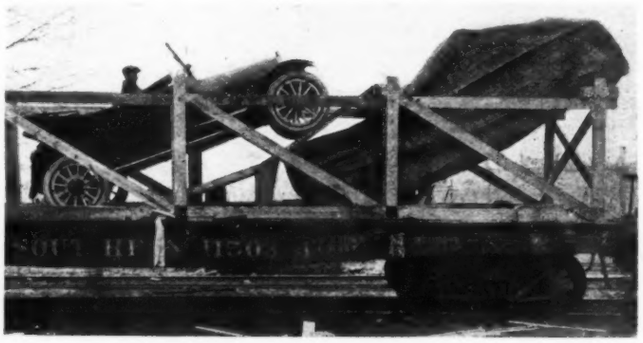


Fig. 9—The method used by the Olds Motor Works in loading cars on end. The cars are driven up the inclined tracks at both sides and blocked

New Pfalz Single-Seater Scout

Fast Plane-and-a-Half Type—Has Elliptic Section Body Covered with Three-Ply Wood and Carries a 160 Hp. Engine

ONE of the latest models of German aircraft to make its appearance on the battlefront is the Pfalz Scout, which is of the type that has come to be known as the plane and a half. This type is characterized by a large top plane and a smaller lower plane. In some of the previous models of this type, like the Albatross, two struts connect to the lower plane in a single point, but in this detail the Pfalz is different, there being a short horizontal distance piece between the lower ends of the two struts. The small lower plane is made with two spars instead of a single center spar, and is therefore a compromise between the single-spar type and the regular two-spar plane, in which the spars are placed the same distance apart as in the upper plane.

One feature of the Pfalz reminding one of the Albatross is that the upper wings are formed in a single piece, and are, of course, without any dihedral angle. The top planes are secured to struts sloping upward from the fuselage. A somewhat novel idea is embodied in the method of securing the lower planes to the body. At the point of attachment there is an inflexion in the curvature of the body outline, the surface of the body swinging outward and gradually merging into the wing surface. That part of the body extending toward the wing may be regarded as a wing root.

The body or fuselage of the Pfalz is of elliptical section, deep and narrow. This has the advantage that both the engine and the pilot are practically entirely within the body, thus reducing the head resistance to a minimum. The narrowness of the body also minimizes interference with the pilot's view. Body construction is of the semi-monococque type, the body being covered by two thicknesses of three-ply wood put on diagonally in long, narrow strips, one strip crossing the other at an angle of about 90 deg. The tail planes are somewhat unusual in that their top surface is flat, while the lower surface is convex. Just what the object of this deviation from conventional practice is it would be hard to say.

The engine fitted to the Pfalz Scout is a 160-hp. Mercedes, and is very well housed in, only the upper ends of the cylinders projecting from the cowling.

Pontiac Centralizes Its Employment of Labor

Organization of Manufacturers' Association Has Eliminated to a Great Extent the Practice of Shop Raiding

By C. J. Shower

FOR the purpose of eliminating shop raiding and of equalizing the scale of wages, the manufacturers of Pontiac have banded together and formed the Manufacturers' Association, whose duty it is to keep an accurate record of all the employed men in the city, find employment for those who seek it and by the same token secure men for the factories needing help.

The association was organized in October, 1917, and since then (to June 4) it has placed 1540 men. It is upheld by the manufacturers by assessments levied on them each quarter, the amount varying according to the expense incurred by the association. One quarter it was 50 cents per employee and the last quarter it was only 40 cents.

Acts as Central Employment Bureau

This association acts as a central bureau of employment. Any man in search of work applies at the office of the association, where an introductory card is filled out and given him to take to the factory where such help is desired. At the factory an application blank (Fig. 1) is filled out in triplicate. The original is sent to the office of the association the same day and the two copies are retained at the factory until the man leaves its employ, when the second sheet with the reasons for leaving is sent to the association for record. The third, or last, sheet remains at the factory.

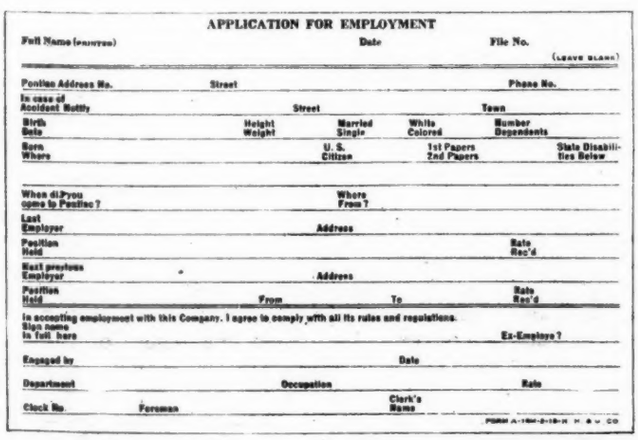
From fifteen to twenty-five men apply at the association for work daily. During February and March the average was much higher—from twenty-five to fifty applications were received daily. It is the policy of the association not to place any man who is at the time employed in another factory. It was astounding what a large number of men came to the office and falsely stated that they were out of work. An employee who states that he has notified his foreman or superior officer that he has quit is considered an undesirable employee and is treated accordingly.

About 5000 names of employees are in the "live" file at the association office—all alphabetically arranged. The cards bearing these names are called "history cards." An accurate record of the employees is kept. In addition to the personal history of the man, space is provided for the names of the places he has worked, and a record of every change is kept. The association can at any time refer to these cards and ascertain where a certain man is employed, how long he has been there, where else he has worked, and whether or not he has a high rating in his line (Fig. 2). A record is kept of all changes within the factory, that is, if an employee goes from one department to another the fact is noted on a slip of paper and sent the association (Fig. 3).

Every day all the factories send to the office of the association a report giving a review of the labor situation. The report made out on the last day of the quarter determines the amount of the assessment to be levied on that factory (Fig. 4).

No Local Advertising for Help

It is agreed by the manufacturers of Pontiac that no advertising for help be done locally. If necessary to advertise, manufacturers must use outside mediums. It is claimed by the association that advertising for Sunday interviews has a demoralizing effect upon the local market. Very little has been done and the executive board recommends that it be not repeated. It is the belief of the association that fully 95 per cent of the men who answer such advertisements are employed. Many of


APPLICATION FOR EMPLOYMENT

Full Name (PRINTED) Date File No. (LEAVE BLANK)

Pontiac Address No. Street Phone No.

In case of Accident Notify Street Town

Birth Date Height Weight Married Single White Colored Number Dependents

Born Where U. S. Citizen 1st Papers 2nd Papers State Disabilities Below

When did you come to Pontiac? Where From?

Last Employer Address

Position Held Rate Rec'd

Next previous Employer Address

Position Held From To Rate Rec'd

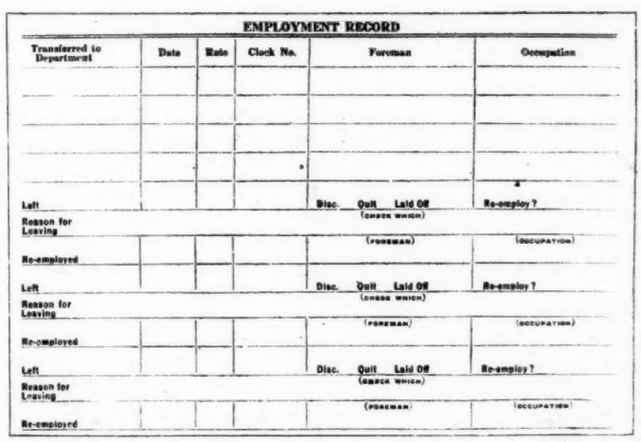
In accepting employment with this Company, I agree to comply with all its rules and regulations.

Sign name in full here Ex-Employe?

Engaged by Date

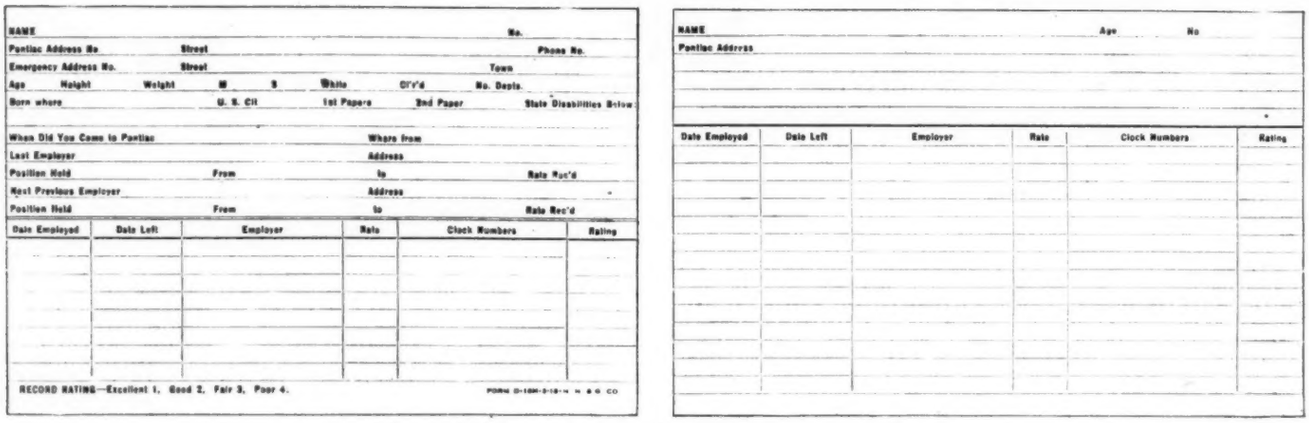
Department Occupation Rate

Clock No. Foreman Clerk's Name


EMPLOYMENT RECORD

Transferred to Department	Date	Rate	Clock No.	Foreman	Occupation
Left				Disc. Quit Laid Off (CHECK WHICH)	Re-employ?
Reason for Leaving				(FOREMAN)	(OCCUPATION)
Re-employed					
Left				Disc. Quit Laid Off (CHECK WHICH)	Re-employ?
Reason for Leaving				(FOREMAN)	(OCCUPATION)
Re-employed					
Left				Disc. Quit Laid Off (CHECK WHICH)	Re-employ?
Reason for Leaving				(FOREMAN)	(OCCUPATION)
Re-employed					

Fig. 1—Application blank, front and reverse sides


NAME No.
Pontiac Address No. Street Phone No.
Emergency Address No. Street Town
Age Height Weight M S White Cit'd No. Depts.
Born where U. S. Cit 1st Papers 2nd Paper State Disabilities Below
When Did You Come to Pontiac Where from
Last Employer Address
Position Held From To Rate Rec'd
Next Previous Employer Address
Position Held From To Rate Rec'd

Date Employed	Date Left	Employer	Rate	Clock Numbers	Rating

RECORD RATING—Excellent 1, Good 2, Fair 3, Poor 4.

NAME Age No
Pontiac Address

Date Employed	Date Left	Employer	Rate	Clock Numbers	Rating

Fig. 2—Employment record, front and reverse sides

these persons have no hesitancy in leaving their employer without a moment's notice and inducing fellow employees to become dissatisfied, impairing the discipline and efficiency of their department and seriously affecting production.

The association desires to protect its home interests and urges anyone to whose notice it may come to notify the office of any attempt by outside concerns to raid its shops. The matter will then be taken up promptly with the offending company by the association.

For the period from Nov. 12, 1917, to March 13, 1918, the introductory slips credit 735 persons as having been sent to members of the association. This does not take into consideration those who were sent before the printed forms were received, those who have not been given introductory slips and those who learned of openings through their friends having been placed through the bureau. This is creditable work.

According to a bulletin recently issued by the association, in one case twelve men from out of town were sent through the bureau to the plant of a member and these in turn informed six other men of openings in their line who applied direct at the plant and were hired. At this time the association was advertising extensively wherever possible throughout the state for laborers, molders, machinists, toolmakers and various other classes of help needed. It was hoped in this way to attract a continuous supply of help to Pontiac to build up its forces, replace those taken by the draft and those leaving for government service.

The number of women being employed is increasing daily, and reports indicate that they are adapting themselves to the requirements with surprising rapidity. The bureau has a number of women registered for work.

Pontiac is at present experiencing a shortage of common laborers. An incident may be cited to show some of the activities of the association. One member received a number of loaded freight cars. Not having anyone to unload them, he applied at the office of the association for help, but to his dismay learned none was available. It meant that he would be obliged to pay demurrage charges because of being unable to unload immediately.

The association at once endeavored to give this member some assistance. It was remembered that three laborers were recently sent to do a job for a certain concern whose work would be completed in a short time. Perhaps the company employing these men would release them under the circumstances. Arrangements satisfactory to the company were made through the association and the three men were sent to the member having the freight cars to unload. After unloading the cars the men were returned to their former work. The arrangement proved satisfactory to both firms concerned.

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Ball Bearing Manual

A COPY has been received of the New Departure Ball Bearing Manual, published by the New Departure Manufacturing Company, Bristol, Conn. It contains a great deal of practical information on ball bearings in general. Descriptions of the four types of bearings manufactured by the New Departure Co. are followed by chapters on installation practice, applying and removing ball bearings without damage, lubrication and inclosure, repairing worn shafts and housing, methods of mounting ball bearings and tables of dimensions, load capacities and prices of the different types of bearings made by the firm. A considerable number of illustrations are given, showing methods of mounting ball bearings in various types of machinery.

DAILY REPORT OF
CLOCK NUMBER CHANGES

FROM _____ FACTORY NAME

DATE _____

LIST NAMES ALPHABETICALLY

OLD NUMBER	NEW NUMBER	FULL NAME

SIGNED _____ CLERK'S NAME

Fig. 3—Record of transfers in factory

FACTORY—
DAILY LABOR REPORT (DATE) 191

	Column	1	2	3
EMPLOYEES AS PER LAST REPORT 191	3			
ADDITIONS SINCE LAST REPORT (Employment Slips Enclosed)	2			
DEDUCTIONS " " " (Discharge Reports Enclosed	2			
NET (INCREASE—DECREASE) (Mark out one)	3			
NET EMPLOYEES	3			
TRANSFERS FROM (ADDITIONS)	1			
" " "	1			
" " "	1			
TOTAL ADDITIONS BY TRANSFER	2			
TRANSFERS TO (DEDUCTIONS)	1			
" " "	1			
" " "	1			
TOTAL DEDUCTIONS BY TRANSFER	2			
NET TRANSFERS (INCREASE—DECREASE) Mark out one)	3			
NET EMPLOYEES	3			

Signed Timekeeper

To the Timekeeper—Fill out the above blank and mail it without folding in a sealed envelope, together with Employment, Discharge and Transfer Reports, at the close of each day and an extra report at the end of each month, to the Manufacturers Association, 79 South Saginaw Street, Pontiac, Michigan.

Fig. 4—Daily labor report

Development of Propeller Manufacture

Output of American Factories Now Fully Equal to the Demand—Materials Used and Methods of Production—Theory of Blade Number

TWENTY-FIVE experienced American manufacturers are now producing between 350 and 400 airplane propellers per day, fitted for the most strenuous air service. Ample stock of propeller timber is already purchased or available and the present supply of propellers in this country is more than equal to the demand.

The number of spare propellers required for each fighting unit was reduced by the air service recently. Hence it has been possible to cut down the original program for the production of propellers.

After the declaration of war the Signal Corps was forced to build up the existing propeller industry and encourage the manufacture of propellers as a new enterprise.

Growth in Number of Manufacturers

In April, 1917, there were four airplane companies making their own propellers. Each of these produced propellers in keeping with the requirements of their airplane output. In addition, six other companies made propellers for airplane companies not manufacturing them and for foreign governments, the U. S. Army and Navy, private aviation schools, and exhibition and amateur fliers. The total output last April was approximately 25 propellers per day.

Since that time, and especially since December, 1917, a great development has taken place. The older companies have expanded and new concerns have sprung up, due chiefly to the increased demand for propellers and the requests of the Signal Corps. The Government cooperated both in design and production, and this co-operation resulted in the adoption of standard methods and economical manufacture. The treatment of airplane propeller lumber was worked out, and many special machines and tools were developed and built, materially reducing the amount of hand work previously necessary.

American double-bladed airplane propellers are built up from boards about 1 inch in thickness, cut out to the rough shape of the laminations. Specifications for mahogany lumber for aircraft propellers as issued by the International Aircraft Standardization Board were printed in AUTOMOTIVE INDUSTRIES of May 23 last.

Treatment of Lumber

The boards or laminations are cut out from carefully selected lumber which has previously been kiln dried to a uniform moisture content of from 6 to 8 per cent, great care being taken to avoid case hardening and too rapid drying, which may diminish the strength of the lumber. The laminations when cut for use in the propeller must be clear pieces, free of all defects and with straight grain running along the length of the piece. After cutting to shape, the boards are balanced individually and selected according to this balance for grouping together for the complete propeller.

Following this selection, the completed groups of laminations are assembled and placed in a hot box to prepare for gluing. With correct temperatures of material and room, gluing is done as rapidly as possible, and the glued-up blocks are left in presses or clamps to set for 24 hours. The blocks are then cut down by carving machines, lathes, shapers, etc., to within about ¼ inch of the final finished size and shape, and in this state are hung for two weeks in a conditioning room before being worked to the final finish.

The finishing operation is performed on the bench and completes the propeller to the point of being ready for varnish or covering. The bench work is done with great accuracy, to insure that the propeller conforms exactly to the desired pitch and shape and has the two blades in exact alignment and track. The propeller, acting as a flywheel for the engine, must be perfectly balanced. When the propeller is finished in the "white," it is ready for inspection of glue joints, dimensions and balance, after which it is finished with 5 coats of spar varnish and rebalanced.

Some propellers have the tips covered with linen fabric to protect them against splitting, which results from picking up sand, running in long grass or in the rain.

Existing opinion is somewhat divided as to the best wood for propeller purposes, but the past practice of the French and English Governments greatly favors walnut and mahogany for combat plane blades, the former being considered best. Other woods have been extensively used for training-type propellers, principally quarter-sawed white oak, birch, cherry and poplar. Originally the walnut used by the French was their own French walnut, but this wood is no longer available. American black walnut has taken its place, and large quantities have been exported to England and France for propeller purposes, as well as for the manufacture of rifle stocks. To-day the available supply of black walnut is limited by the ability of producers to obtain the scattered timber, and the demand is greatly in excess of the supply. The exclusive use of black walnut for rifle stocks manufactured in the United States has an important bearing upon the available supply for propellers.

Mahogany Used Comes from Central America

All the mahogany used has, for the past four years, been exported as lumber from the United States, having been imported in the log from Central America and Mexico. Some of the largest and best tracts of mahogany timber are in British Honduras. This is being cut under the direction of the British Admiralty and brought into the United States for manufacturing into propeller lumber before exporting to England. Large quantities of British Honduras mahogany and other tropical mahogany have been exported, so that the existing situation is one wherein the available supply is just about adequate for the combined demands of the Allies and the United States, provided restrictions are placed upon the use of mahogany propeller stock for commercial purposes. This situation affecting the manufacture of furniture, pianos and the like can be relieved by the use of substitutes, such as Philippine mahogany, which is lacking in some qualities required by the specifications for propeller wood.

It is believed that quarter sawed white oak will come to be used more generally, on account of its greater

strength and the necessity for getting maximum strength in the propellers used on the newer high-powered, high-speed engines.

The amount of wood in the present two-bladed propellers varies from 30 board feet in a training type to 80 feet in a combat type. These figures are net, while the gross lumber required to manufacture will be about twice the net amount in both instances.

Many attempts have been made to design and produce a metal propeller, but to date no tests reported have been sufficiently successful to warrant putting the propellers into production. The difficulty is to construct the blade light enough and strong enough to resist the tensile and bending strains set up. Propellers have been manufactured from a synthetic material called "Bakelite," shaped under hydraulic pressure at a high temperature. To date these have been successful, in destruction tests and flight. They weigh slightly more than wooden propellers of the same design but have greater resistance to wear and tear.

In determining the number of blades to use in the propeller, account is taken of the double requirement of developing the maximum efficiency in converting shaft horsepower into propulsive horsepower and at the same time developing a blade that will be adaptable to the construction of the complete machine.

The greatest efficiency is always obtained by a two-bladed propeller of the largest diameter that the engine will turn at the correct engine speed. In this way the propeller has an effective thrust over the maximum possible air area, with least blade surface resistance.

In many cases, however, the construction of the plane is such that a two-bladed propeller of sufficient diameter cannot be used on account of clearance, and the three or four-bladed propeller is adapted to take up the full horsepower in effective thrust, in spite of greater resistance losses. The four-bladed propeller is generally used instead of the three, because of its simpler and stronger construction features. The two-bladed propeller is more efficient than the three or four, and would always be used if the arrangement of plane and engine permitted.

An Improved Cost Keeping System

Mechanical Time Recorders Make for Accuracy—Electric Clock System, Comprising a High Grade Master Clock and Secondary Clocks Throughout the Plant, Adds Further to Accuracy

A TIME recording system for cost keeping, making use of secondary clocks operated from a master clock by means of electric current, is manufactured by the Stromberg Electric Co., Chicago. The machine makes an imprint of the exact time on a card or work ticket, which may be placed in it for that purpose. As a rule, secondary clocks and time recorders are distributed throughout the shop, the clocks being operated from the master clock which is located in some central position, generally the main office. The master clock is a high grade timepiece and claimed to keep accurate time. The mechanism of this clock is used to periodically make electric contact, to the end that electric current may be transmitted through relays at regular intervals to operate the electromagnets of the secondary clocks. The master clock is self-winding, the work of keeping it wound being accomplished by the same current that operates the secondary clocks, and as all of the secondary clocks must always be in absolute synchronism with the master clock, the same time is shown by clocks throughout the plant.

The Stromberg company points out the advantage of the mechanical system of recording the time spent on different operations in the shop, insuring the greatest degree of accuracy in the cost keeping. When workmen are required to put down the time spent on different jobs with a pencil, they often wait until the end of the day and guess at the time worked on different jobs. It is obvious that this introduces appreciable errors.

We show herewith an illustration of the Stromberg company's time recorder and also reproduce a combination pay roll and cost coupon ticket worked out by the accounting department of the Metal Specialties Mfg. Co., Chicago, which is filled out from the records of a Stromberg time recorder. This ticket takes care of both day and piece work. It permits of quickly accounting for a full day's time. The top coupon is marked under the employee's number in the payroll department and the totals are added at the end of the pay period. No daily posting is necessary. The job coupons go to the cost department and are there filed under their respective numbers and totaled when the job is completed. It is claimed that by this method much posting and chance for error are eliminated.

Stromberg electric time clock

METAL SPECIALTIES MFG. CO.

PAY ROLL STUB

EMPL. No. 83 DATE 9/21/17

ORDER No.	DAY WORK HOURS	DAY WORK WAGES	PIECE WORK HOURS	PIECE WORK WAGES
292	2.4	72		
289			4.0	1 38
305			3.1	92
TOTAL	2.4	$ 72	7.1	$ 2 30

SEP 21	9 5	TIME	F	ORDER NO. 292	EMPL. NO.	PC. WK.	
SEP 21	7 1	2.4	S	ARTICLE NO. 1324	83		
OPERATION Threading							
MACH. NO. 6	REGISTER STOP 7954	RATE PER 1000	RATE PER HOUR 30	LABOR COST 72			
	START 7450						
	MADE 504	APPROVED B					
SEP 21	7 1	TIME	F	ORDER NO. 289	EMPL. NO.		
SEP 21	3 1	4.0	S	ARTICLE NO. 1550	83	DAY WK.	
OPERATION Blanking							
MACH. NO. 12	REGISTER STOP 9844	RATE PER 1000 40	RATE PER HOUR	LABOR COST 1.38			
	START 6397						
	MADE 3452	APPROVED B					
SEP 21	3 1	TIME	F	ORDER NO. 305	EMPL. NO.		
SEP 21	0 0	3.1	S	ARTICLE NO. 1159	83	DAY WK.	
OPERATION Hand Screw Mach-							
MACH. NO. 4	REGISTER STOP 4736	RATE PER 1000 130	RATE PER HOUR	LABOR COST .92			
	START 4028						
	MADE 708	APPROVED B					

Time card

Solving the Problems of Female Labor in a Car Making Plant

The Importance of Careful Selection of Women Employed and Sympathetic Supervision Over Them, as Shown in the Experience of the Maxwell Company—Rest Rooms and How They Should Be Used

Women exclusively are employed in this department of the Maxwell plant. More than fifty of them are engaged here in assembling ignition and lighting wiring units

THE several problems incidental to the employment of women in large numbers in manufacturing plants where they have not previously been used to any great extent have been given careful study by the Maxwell Motor Co. of Detroit, where recently it was estimated that fully 12 per cent of the working force is made up of female operatives.

Special thought has been given by the Maxwell company to the method used in selecting the women who are employed, to adequate arrangements for and equipment of rest rooms, to the proper dressing of the women for their work, to the provision of hospital facilities and cafeteria. The company has its Supervisor of Female Welfare in the person of an experienced woman.

Great care is exercised by the superintendent of employment who hires the help to see that there are taken on only such women as are not working merely for pin money with which to buy clothes and luxuries. It is considered inadvisable to hire a married woman whose husband earns six dollars or more a day, as she would be very apt to leave on short notice after having earned sufficient money with which to purchase some particular article or make certain investment, the desire for which had provided the chief reason for seeking employment.

The girls who apply for work at the Maxwell plant are first interviewed by the supervisor of female welfare, who ascertains particulars in regard to their ambitions, their home life and their physical condition. In order to minimize the percentage of transient help, they are thoroughly questioned as to whether or not their livelihood depends upon their employment. They are then turned over to the superintendent of employment, who has a faculty for reading human nature and hires only those who he believes will make the best grade of women workers.

Success Largely Due to Careful Selection

By weeding out the applicants and recommending for employment only those who are likely to develop into good workers, much of the credit for obtaining such excellent results as have been obtained from the use of women at the Maxwell plant is given to the supervisor of female wel-

fare. She is a woman of very pleasing personality, who makes it her business to be a friend to all the girls, encouraging them and keeping them satisfied with their work and factory surroundings at all times.

If a girl is dissatisfied with the work she is doing, or if she desires to increase her earning capacity, she is transferred to some other job where she has more congenial surroundings or an opportunity to earn more money. If the work allotted to any girl is found too heavy for her she immediately reports at the supervisor's office, presents her statement of the case and is transferred to lighter work.

One of the four rest rooms for women workers at the Maxwell plant. It is impressed upon the women that the privileges of these rest rooms must not be abused

On a card index maintained by the supervisor a record is kept of the name of each dissatisfied employee, the nature of her work, her foreman, present wages, and the date on which the dissatisfaction was manifested. The matter is investigated by the supervisor, who confers in regard to the case with the foreman in charge of the particular department in which the girl works. If it is decided that an increase in pay is merited, or a change of work desirable, it is immediately put through. When the change or increase is made, a notation to that effect is made on the card in red ink and the card is disposed of in a dead file. In this way the women are kept satisfied and the company is saved much inconvenience and cost resulting from losing help and breaking in new operatives. The minimum wage at the Maxwell plant is $2.50 per day and some of the women make as much as $4.50 a day on piecework.

Rest rooms are regarded as of prime importance and are established chiefly as places for the women to change their clothes, and to provide space for the woman who is suddenly taken ill to rest in retirement. They are not intended to be general loafing places, and women are not permitted to go to them at any time they may happen to choose for the purpose of loafing. If a woman is out of work she must remain at her machine or at least in the department where she is working. Lunching in the rest rooms is discouraged.

The Maxwell company maintains three spacious rest rooms, one of which is shown in an illustration herewith. The girls are allowed to spend their noon hour in them in dancing, reading or playing games. These rest rooms are furnished with lounges, easy chairs, palms; in fact, everything possible which would add to the comfort of the girls employed at the plant.

A matron is placed in charge of each rest room to look after the requirements of the girls and to keep the room in order. The girls are allowed to spend 10 minutes during working hours in these rest rooms, and, in order that the privilege may not be abused, the matron records when a girl comes in and informs her when her time is up. However, the precaution seems hardly necessary, as in only a very few instances is advantage taken of this privilege. Adjoining the rest room are cloak rooms, wash rooms and toilets. Another large rest room is being constructed at the Maxwell plant, as women are hired every day in increasing numbers.

In one section of the factory is a general hospital and doctor's office shown in the illustration herewith. Both men and women are treated in this hospital, there being separate rooms for male and female help. All employees are given to understand that no matter how small an injury may be, even if it is only a scratch, they should report at the doctor's office for treatment. In this department a physician is in charge assisted by two trained nurses.

A view of the Maxwell company's cafeteria exclusively for women

A Restaurant on the Serve-Self Plan

A cafeteria for those women who do not care to bring their lunch is also maintained at the Maxwell plant. It is shown in the illustration herewith. It is conducted on the serve-self plan and the girls can have whatever they want to eat.

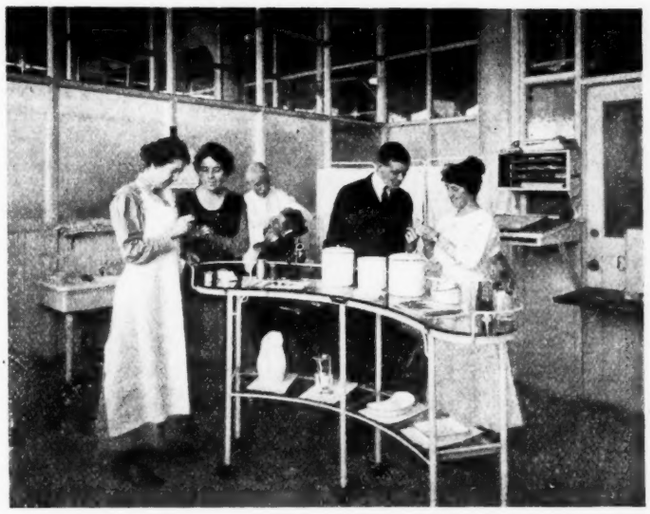
The women workers in the Maxwell plant are furnished with bloomer uniforms and caps in cases where the work

is dangerous. These uniforms are laundered and kept up at the expense of the company. The women go about their business in these uniforms without any annoyance from men employees. The men are warned by the foreman of each department that such conduct would constitute a serious offense and the guilty liable to dismissal.

Visiting among female employees during working hours is discouraged by the foreman, and the machines on which the girls work are spaced far enough apart so as to preclude conversation or whispering among the girls during the working period.

Much Depends on Foremen

According to the views of those in charge at the Maxwell company, success in adapting women to the industry rests with the foremen, who should aid in their proper training, and at all times lend their influence to maintaining good deportment. The women who are serious-minded and show a desire to improve and become adapted should be given careful and painstaking encouragement; while, on the other hand, those who do not adapt themselves to conditions and are prone to visiting soon eliminate themselves.



General hospital and doctor's office at the Maxwell plant. There are separate rooms for male and female employees in addition to the general office shown above

An Innovation in Strip Steel Practice

THE rapid development of the automotive industries and their demand for improved materials have led to the introduction of new methods in rolling and handling strips in standard and alloy steels. To meet the requirements especially of the automobile industry, the National Pressed Steel Company has recently put down an interesting plant at Massillon, Ohio. This plant was designed to turn out a wider range of sizes and the proper quality of hot and cold rolled strips used in deep drawing, stamping, forming and pressing operations.

In order to be able to accurately gage the demands of the trade, a questionnaire was prepared containing thirty-seven questions. This was sent to a large number of manufacturers of pressed and drawn products, and the returns from it were most satisfactory, inasmuch as 47 per cent of those addressed answered either all or some of the questions posed. The information thus obtained, relating to the size, finish, chemical analysis and physical properties of the steels used by those addressed, was made the basis for the design of the new plant. In spite of the adverse conditions in the materials and machinery markets, it was only ten months and one day from the time ground was broken until the new plant was in operation.

For the product of the new plant it is claimed that it can be used without annealing for many purposes which have called for annealed strip heretofore. Raw material is received in the form of slabs and billets and is unloaded from the cars by means of cranes carrying rectangular lifting magnets. Before any material is placed in stock or used, each piece is carefully inspected for seams, pipes or any other defects which could be rolled into the steel by later manipulation and not detected until the material was in the customer's presses. The stock yard has a capacity of from 15,000 to 20,000 tons of steel and adjoins the mill building.

Great care and attention were given to the design and detail for the furnaces to insure uniform heating. They are of the large continuous reheating type, using powdered coal as fuel. All parts and accessories were specially designed and constructed for this method of heating. Pushers, drawing machinery, door hoists, transfer tables and all equipment auxiliary to the furnaces are electrically operated. The steel is transferred to the roughing mill in a unique manner, and in such a way that practically all furnace scale is removed.

The roughing mill is a high speed 24-in. two high universal mill and is driven by a Westinghouse reversing motor similar to those used in blooming mills, but smaller and much faster. An idea of the extreme proportions of the mill will be conveyed by the statement that the housings weigh approximately 42 tons each, and that all other parts are correspondingly heavy. When it is borne in mind that this company produces large quantities of special alloy steels in the form of strips up to No. 00 gage by 24 in. wide, the necessity for such heavy units will be appreciated. The extreme rigidity of the mill and foundations are also realized upon considering that when finishing 0.50 carbon steel less than one-thousandth inch (0.001 in.) is allowed for spring of the mill. The vertical rolls on this mill are designed and operated so that proper side work may be given the steel. This method of rolling also holds the width dimension to slight variation.

If the material is brought to gage on the roughing mill, the strip is turned over after rolling in order to facilitate inspection and remove any slight remaining scale. It is then transferred to a leveller or straightener of extremely rugged construction. From this the product is delivered to the hot bed.

When producing lighter material only the roughing operations are used on the roughing mill, as a train of finishing mills has been provided for the final passes. These mills are operated entirely by mechanical means—no manual labor being required. Driving power is furnished by a Westinghouse motor of the Kramer type, permitting a wide range of operating speeds with good electrical efficiencies.

From these mills the material is delivered to hot bed or coiler as may be required. On leaving the hot bed the strips are cut to length and piled by a mechanical piler, placed in stock if they are to be shipped as plain hot rolled material, or transferred to the finishing department if additional treatment is required.

In addition to the usual slitting, shearing, oiling and liming machinery, the finishing department has extensive facilities for heat treating and picking. Each furnace has a charging capacity of approximately 25 tons and also the necessary mechanical means for reading and heat control, assuring uniform and proper heat treatment. The furnace men can observe and control the furnace temperature at all times, but the recording instruments and the records are seen only by the department superintendent, who thus has a definite and accurate record of all conditions and every operation employed on past work. The pickling vats are of the plunger type in standard details, but of large size for pickling large pieces whether flat or coiled. The steam for heating pickle liquors and other miscellaneous heating processes is generated by a boiler placed over the annealing furnace flues.

War Airplanes of To-Day

A Comprehensive Collection of Photographs and Descriptions of the Scout, Reconnaissance, Battle and Bombing Planes and Flying Boats in Use in the World War

(Concluded)

IN the July 4th issue of AUTOMOTIVE INDUSTRIES appeared the first part of this comprehensive collection of photographs and descriptions of airplanes, employed by the warring powers in Europe, which formed the basis of the paper which was presented at the Dayton meeting of the Society of Automotive Engineers by Fay Leon Faurote.

The planes shown and described previously were the Bristol tractor monoplane and scout tractor biplane, the Morane Parasol and three place tractor; the Spad pursuit biplane, the Pomilio and the Thomas Morse single seater. The remainder of the collection is shown on the following pages.

HALBERSTADT SINGLE-SEATER MACHINE

Equipped with an Argus or Mercedes engine. Fish-shaped fuselage. Staggered planes—the upper plane with overhang. Width, 28½ ft. and length, 24 ft.

MARTINSYDE SCOUT TRACTOR BIPLANE

One-seater, powered with a 120-hp. Beardmore, which drives a two-bladed, 9 ft. 6 in. propeller with pitch of 6 ft. Span, 38 ft.; chord, 5 ft. 11.75 in. Gap, 5 ft. 8 in. Overall length, 26 ft. 6 in. It is moderately fast, making 98 m.p.h. near the ground and climbing 3000 ft. in 4 min. The complete machine unloaded and dry weighs about 1400 lb.

D. F. W. AVIATIK C V

The wings have a dihedral but no sweepback. The span of the lower wings is 42 ft. 5 in., nearly equal to the span of the upper wings, which is 43 ft. 8 in. The ends of the upper planes are oblique, those of the lower retreating and rounded. The maximum chord is 5 ft. 9 in. The total lifting surface is about 421 sq. ft. The gap is 5 ft. 7 in. The angle of incidence of the upper plane is 5 deg. from the cabane to the sixth rib and 3.3 deg. at the thirteenth rib, where the ailerons commence. There are two pairs of struts on either side of the fuselage. The metallic ailerons are rectangular with rounded ends. The empennage has a heart-shaped appearance. The fuselage, rather shallow in depth, terminates in a vertical knife-edge in the rear, with a somewhat pointed propeller pot in front. It has the standard landging-gear.

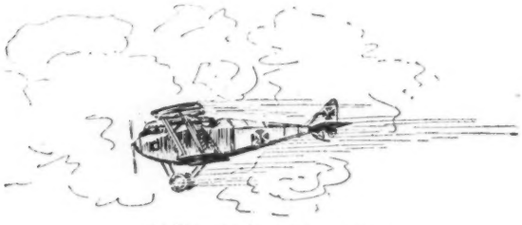
The D. F. W. is equipped with a fixed Benz engine of 228 hp. at 1410 r.p.m., almost entirely inclosed in a special cowl. The radiators are mounted on the sides of the fuselage. The pilot sits on the gasoline tank, with a machine gun within easy reach of his right hand; the passenger sits behind in rear cockpit. The full load carried is 2100 lb., of which 660 lb. is the useful load.

C-4 RUMPLER (GERMAN SINGLE-SEATER BIPLANE)

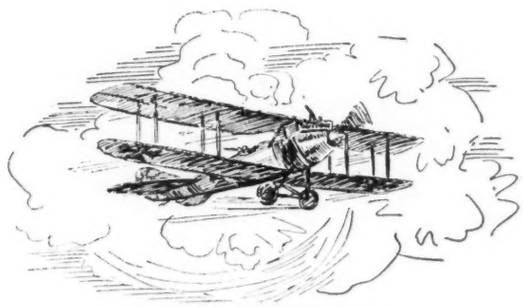
The upper plane is 12.6 m. span, the length, 8.4 m., height, 3.25 m., chord, 1.7 m., gap, 1.85 m., dihedral angle, 2 deg., the angle of incidence, 5 deg. and a sweepback of 3 deg.

The C-4 is generally equipped with a 200-hp., six-cylinder Mercedes. The tank capacity is 290 liters. Contrary to German practice, the trailing edges are rigid.

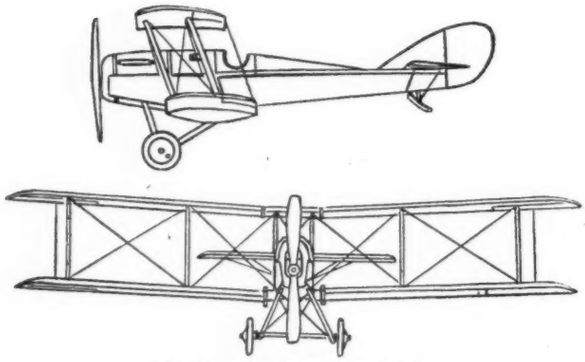
The upper wings are cut out for visibility above the body. The lower wings have rounded tips like a D. F. W. It has two pairs of interplane struts on either side, narrow horizontal stabilizers and balanced elevators. The control cables are carried entirely within the body in wooden tubes. The fuselage is of regular construction of wood and wires. The engine is similar to that used in a Zeppelin; its radiator has blinds. It is equipped with one fixed Spandau machine gun.



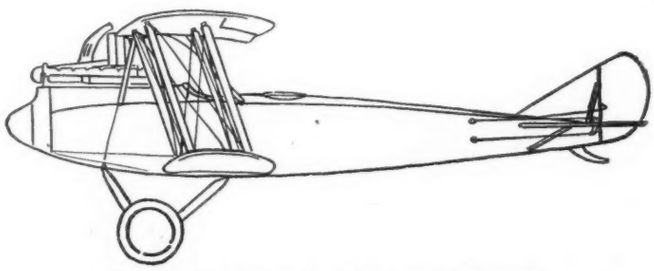
Halberstadt (German)



Aviatik DFW (German)



Martinsyde Scout (British)



Profile of the Rumpler C-4 type (German)

The pilot sits in front, the gunner in the rear. It has a Parabellum gun placed in the rear and four bombs, radio and camera are carried.

It will climb 16,400 ft. in 35 min. The machine is good for all purposes and high altitudes have been made with it. The machine can fly 4 hr.

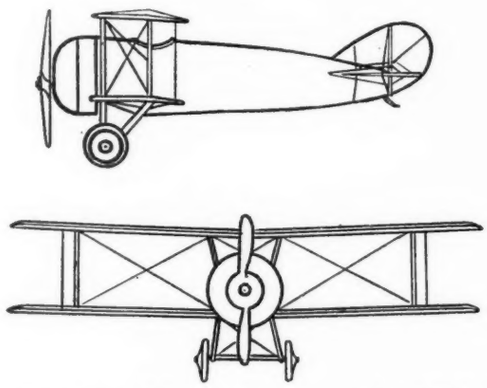
STURTEVANT SINGLE-SEATER SCOUT

It has pyramid trussing. This is a half-wing feature made by the steam-lining of the single lower spars. The stationary engine is carefully cowled. Overhead radiators are set into the wings. Its design affords a wide range of view and good facilities for mounting a machine gun. Its compactness is notable. All structural parts are built of vanadium steel. It is fitted with 150-hp. Sturtevant engine, of the eight-cylinder, water-cooled type. The net weight is 1000 lb.

VICKERS SCOUT ES-1 ONE-SEATER BIPLANE

Rather chubby fuselage; small wing span, 24 ft. 4½ in.; only 20 ft. 4 in. long and 8 ft. 10 in. high. Driven by 100 to 110-hp. air-cooled Clerget or 110-hp. LeRhone, equipped with 8-ft. 6½-in. propeller of 8-ft. 2½-in. pitch, two-bladed. Aspect ratio 5.1. Small dihedral of 1 deg.; no stagger and no angle of incidence. Chord, 4 ft. 9 in.; gap, 4 ft. Total weight, 1500 lb. Carries 28 gal. of gasoline and 6½ gal. of oil. Climbs 10,000 ft. in 18 min. Maximum speed, 112 m.p.h.

The Vickers Scout is a difficult machine to fly and tiring



Vickers Scout E.S.I. with rotary engine (British)

on the pilot. Great care is required in landing. The machine is tail-heavy with the engine on. It will get off in about 325 ft. and can be stopped in 600 ft. if the engine is off. A slightly better performance is attained by the use of the 110-hp. LeRhone engine.

ENGLISH S.E.5.A. SINGLE-SEATER FIGHTER

The two wings have an area of 22.8 sq. m.; span, 8.15 m.; chord, 1.52 meters. Stagger, 0.46 m. The wings have no sweepback. Dihedral, 171 deg. The lower wings are cut away near the body for a better view. The angle of incidence of the wings is 5 deg.

The interplane bracing is streamline wires. That of the overhanging portion is thick-ended wire. The trailing edge of the wings is formed by a wood strip. Between every two ribs are two short false ribs running from leading edge to front spar. The engine section struts are steel tubes streamlined with wood fairings. The interplane struts are of wood. The lift wires are in duplicate and landing wires single. Non-balanced ailerons are hinged to the rear spar on both upper and lower wings.

The fuselage is a type of girder, and has a turtleback formed by vertical formers. It is covered up with wood as far as the pilot's seat. The tail plane, cambered on both sides, is so attached to body that its angle of incidence can be varied during flight from + 4.5 deg. to — 3 deg. The front spar oscillates freely from end; the rear spar and its bracing is attached to a tube, which can be raised or lowered in the stern post of the body.

The under-carriage is of the usual type. The tail skid,

Sturtevant Scout (American)

which is of unusual construction, is swivelled from the stern post and connected to the rudder control-cables. A brass shoe is sprung by means of two spiral springs inclosing telescopic tubes.

The inclosed Wolseley-Hispano engine develops 206 hp. at 2005 r.p.m.

The radiator forms the nose of the body. Shutters operated from the pilot's seat permit of covering up about half of the radiator. The main gasoline tank is mounted behind the engine on the upper longerons.

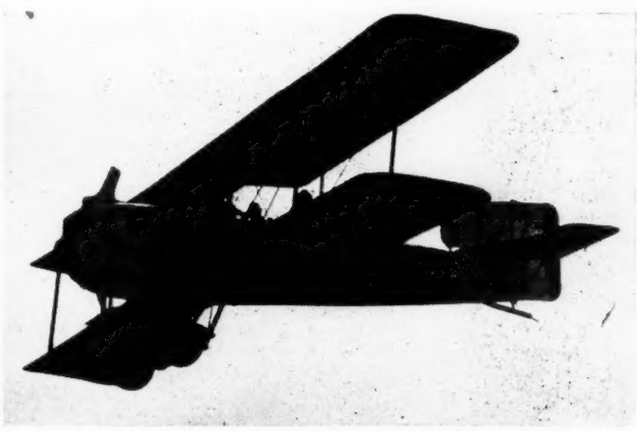
The fixed machine-gun is mounted to the left of the pilot inside the body covering. The firing of the gun is operated hydraulically by control mechanism in front of the engine, and driven by spur gearing on the propeller. The trigger is mounted on the control lever. On a bent rail above the center section of the upper plane is a Lewis machine-gun which can be pointed to fire upward during flight.

The weight of machine empty is 706 kg., and 250 kg. useful load is carried.

Battle Planes

BREGUET RECONNAISSANCE TWO-SEATER

It is powered with a 450-hp. Renault twelve-cylinder engine. The gross weight is about 3700 lb. It carries a live load of about a half ton. It has a spread of 38 ft., a small dihedral on the upper plane only and a little sweepback. It is made largely of aluminum, the ribs are wood. The speed is about 128 m.p.h., and the machine will climb 16,000 ft. in 19 min. It carries four machine guns. It has a double set of ailerons, the lower ones being longer and extending from the wing tip nearly to the body. The elevators are balanced. There are two vertical fins and a vertical rudder. It has a three-wheeled landing-gear. The machine may be recognized by its three sets of struts on either side and set of V-struts in the



Breguet in flight (French)

Twin-engined Bristol (British)

Captured L.V.G. (German)

center, the line of which if continued makes a large V with the front landing-gear. An M is formed by the trussing of landing-gear.

Bristol with Two 120-Hp. Beardmore Engines

Two two-bladed propellers of 9 ft. 6 in. diameter and 7 ft. 8½ in. pitch. Weight, 5210 lb. Maximum speed, 85 m.p.h. Comparatively wide span of 53 ft. 6 in.; overall length, 39 ft. 2 in., and is 12 ft. 8 in. high. Capacity for 115 gal. of gasoline, 9 gal. of oil, and 10 gal. of water. Total wing area, including tail planes and elevators, 945 sq. ft., making a loading of 5.5 lb. per sq. ft. Aspect ratio, 6.7. Stagger slightly less than 1 ft. Dihedral, 4 deg.; angle of incidence, 2 deg.; chord, 8 ft.; gap, 7 ft. 10½ in.

This machine is heavy and extremely trying to fly. It has to cover considerable ground to get off and cannot be landed in a small field. It is a very slow climber, taking 54 min. to climb 10,000 ft.

L.V.G. (Made in Two Types)

The D-9 has a 175-hp. Mercedes or Benz engine, the D-2 a 235-hp. engine. It is distinguished by its half-negatived ailerons. The D-2 has a wing chord greater near the fuselage than at its extremities.

German Rumpler Two-Seater Machine

It is equipped with a 260-hp. six-cylinder vertical engine, but actually develops 286 hp. at 1500 revolutions. It has little dihedral and very little stagger. The war load is 1150 lb., and it will attain a speed of 110 m.p.h. It cannot climb very well, making only 14,000 ft. in 35 min. and 16,000 ft. in 42 min. Its weight is 10.6 lb. per square foot.

Bristol Two-Seater Tractor Biplane

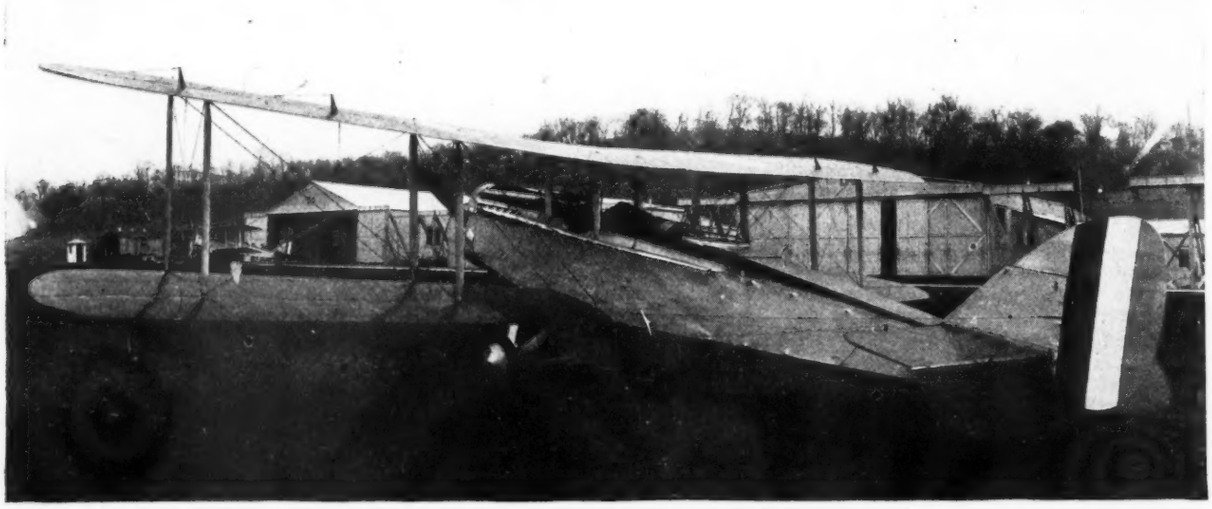
One of the best known of British reconnaissance machines. Powered with a 200-hp. water-cooled engine, driving a four-bladed propeller of 8 ft. 1 in. diameter. Credited with air speed of 111 m.p.h. At this speed it consumes 14½ gal. of gasoline with the engine running at 1290 r.p.m. Equipped with this engine it climbs at the rate of about 68 m.p.h. Wing spread, 42 ft. 6 in. Overall length, 31 ft. 1 in.; 10 ft. high Aspect ratio, 7.7. Dihedral, 3 deg.; stagger, 12 in.

Equipped with a 310-hp. Rolls-Royce and crew of two, this bombing machine carries a total military load of 545 lb., makes a speed of 130 m.p.h. at 10,000 ft., and climbs 15,000 ft. in 21 min. It has an air endurance of four hours at full speed at 15,000 ft., including climb to that height. The machine weighs fully loaded 3575 lb. The machine is modern in design and has a tail that can be adjusted by the pilot so that he is enabled to climb at any speed without effort.

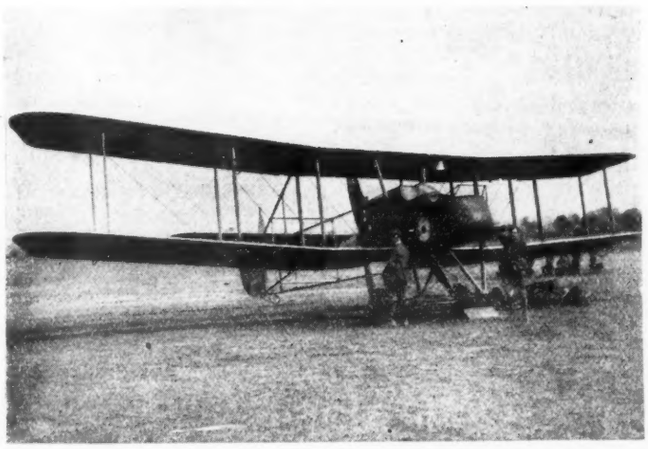
British FE 2-B Two-Seater Pusher Biplane

Equipped with 160-hp. Beardmore and four-bladed propeller 8 ft. 11.9 in. diameter. Wing spread, 48 ft. Chord, 5 ft. 6 in. Gap, 6 ft. 3 in. It is 33 ft. 4 in. long and 12 ft. 8 in. high. Carries total useful load of 976 lb. Total flying weight is 3037 lb. The best climb with which it is credited is 10,000 ft. in about 40 min.

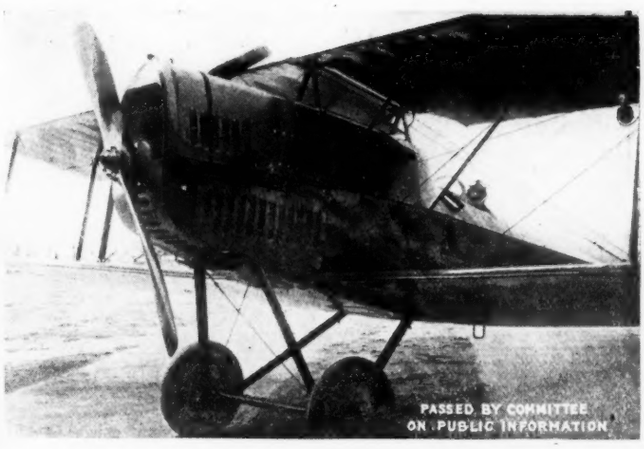
It is very stable and is especially useful for photographic



Battleplane (DH4) built in United States



FE26 (British) Pusher Plane



S.I.A. (Italian) with 300-hp. Fiat engine

and reconnaissance work. Being a pusher the engine is located in the after part of a nacelle, and the empennage is carried at the extremity of a V-shaped outrigger system of trusses. The machine has a wide tail with a comparatively small chord. The nacelle projects forward from the central portion of the machine and carries a pilot in the after cockpit and a gun and gunner in the forward. The landing-gear has the well-known third wheel in front. The machine is readily distinguishable on account of its peculiar rudder form.

S. I. A. Two-Place Combat Machine

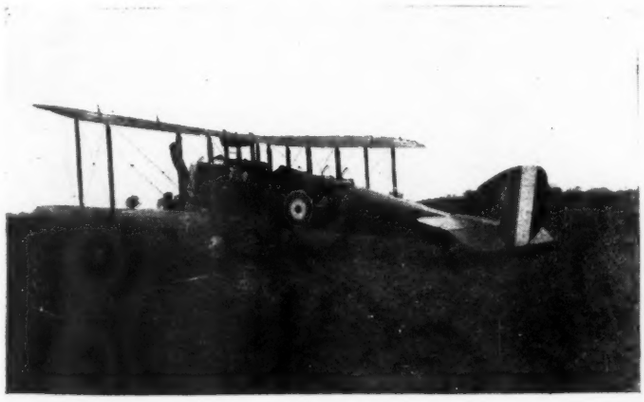
This Italian biplane has remarkable air endurance. It made a non-stop flight from Turin to London and a 100-mile flight from Turin to Naples and return. It is equipped with a six-cylinder Fiat engine with an exhaust stack leading to the upper plane. Both planes have an equal span. Central braces from the fuselage to the upper plane are in the form of a letter W. The trailing edges of plane surfaces are straight and not formed of wire. A balanced rudder is used. It has a high forward compartment and flies in a tail high position so that the pilot-seat is unobstructed.

Farman F-40. Single Ailerons on Upper Plane Only

Pusher type of biplane with a Renault or Lorraine-Dietrich engine. Nacelle above the lower wing plane which has only about two-thirds the span of the upper panel. Empennage carried at end of outriggers, which terminate in vertical knife-edge.

Roland (German) Two-Seater with 175-Hp. Mercedes

Carries machine gun and bombs. Fuselage egg-shaped, very high and narrow. Windows provided in sides of fuselage for observation. Fuselage fills in entire space between wings. Only one interplane strut on either side of fuselage. Planes considerably staggered. Fin and rudder very high.



The DH4 (British)

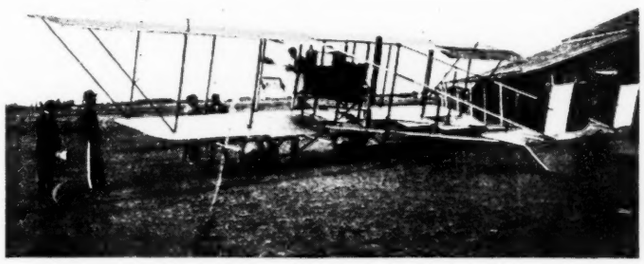
English DH4 (Redesigned to Take the Liberty Engine)

This machine has a wing-spread of 42 ft. 7 in. Its length over all is 30 ft. 7 in. It is equipped with one Liberty twelve 420-hp. engine. Its weight, empty, is 2337 lb., and when completely loaded about 4100 lb.

Bombing Machines

Twin-Engined A. E. G. (German) Bombing Biplane

Basically the A. E. G. bomber is similar to the Gotha biplane, the latter being somewhat larger however; also the former has its two propellers placed in front of the main



Reconnaissance Farman (British)

planes—the Gotha has pusher screws. The wings sweepback, are placed at a dihedral angle, appearing larger in the bottom than in the top plane. The span of both wings is the same, 57 ft., the overall length about 30 ft. The ailerons, peculiar in shape, are fitted to the top wing only and operated by a crank lever working in a slot. The tail wings, of monoplane type, have fixed stabilizing planes and a vertical fin-hinge to elevators and rudder respectively. Elevators and rudder have forward projections in order to partly balance them. The tail skid, which is under the stern of the fuselage, is sprung, not by rubber shock absorbers, but by coil springs. This is also the case with the landing-chassis.

The material used in the construction is mainly steel; the ribs and main planes are of wood. The main spars are of steel tubes. The fuselage is built up of steel tubes, also the longerons, struts and cross members. These are connected by welding; the joints are stiffened and an anchorage provided for the cross bracing wires by triangular pieces of sheet steel welded to longerons and struts.

There are three divisions for passengers. The cockpit in the extreme nose provides a seat for the bomber, who sights through openings in the floor. A rack is placed at the right for holding bombs. Under the center of body there is another bomb-holding rack and near the inner ends of the lower plane there is space for more. The center cockpit has two seats for two pilots or two pilot gunners. Behind the pilot's cockpit is the gunner's, who operates a machine gun mounted on a turntable. The engines are generally of 260-hp. Mercedes

Breguet Bomber (French)

type, and placed one on each side of the center section of the lower plane. The main gasoline tank is carried in the pilot's cockpit, and a service gasoline tank is fitted in each engine housing. The speed is not known, but is roughly estimated at about 90 m.p.h. The head resistance appears to be excessive.

Breguet Bomber of Tractor Type

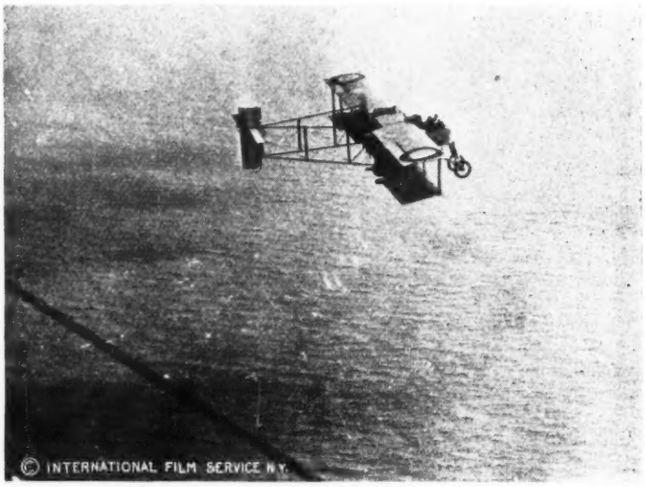
This machine is an example of excellent streamline construction and compactness, and its construction represents a marked advance in engine cooling. Attention is called to the louvers in the cowl, and also to the clean opening between the panel and the fuselage. It is being used for bombing and has a great carrying capacity for its size. Its war load is 1900 lb. It has a speed of 110 m.p.h. and will climb 12,000 ft. in 33 min.

Types of Caudron Machines

The Caudron G-4 has two rotary LaRhone engines carried in small nacelles between the planes. The pilot's nacelle is situated between the engine nacelles. The empennage is carried on four outriggers running back on a line with the engines, the lower outriggers acting as landing-skids. The four fins and four rudders are carried above the tail.

The Caudron G-6 has two rotary LaRhone engines and four landing-wheels. The upper wing is large with a considerable overhang. The lower wing is much smaller and narrower. The trailing edge is flexible. There are twin powerplants in line with the centerline of the landing-chassis. The fuselage is fish-shaped and in the center of the machine. The two main struts are on either side of the engines; the outer forms part of the triangular truss with a slanting strut supporting the overhang of the wing.

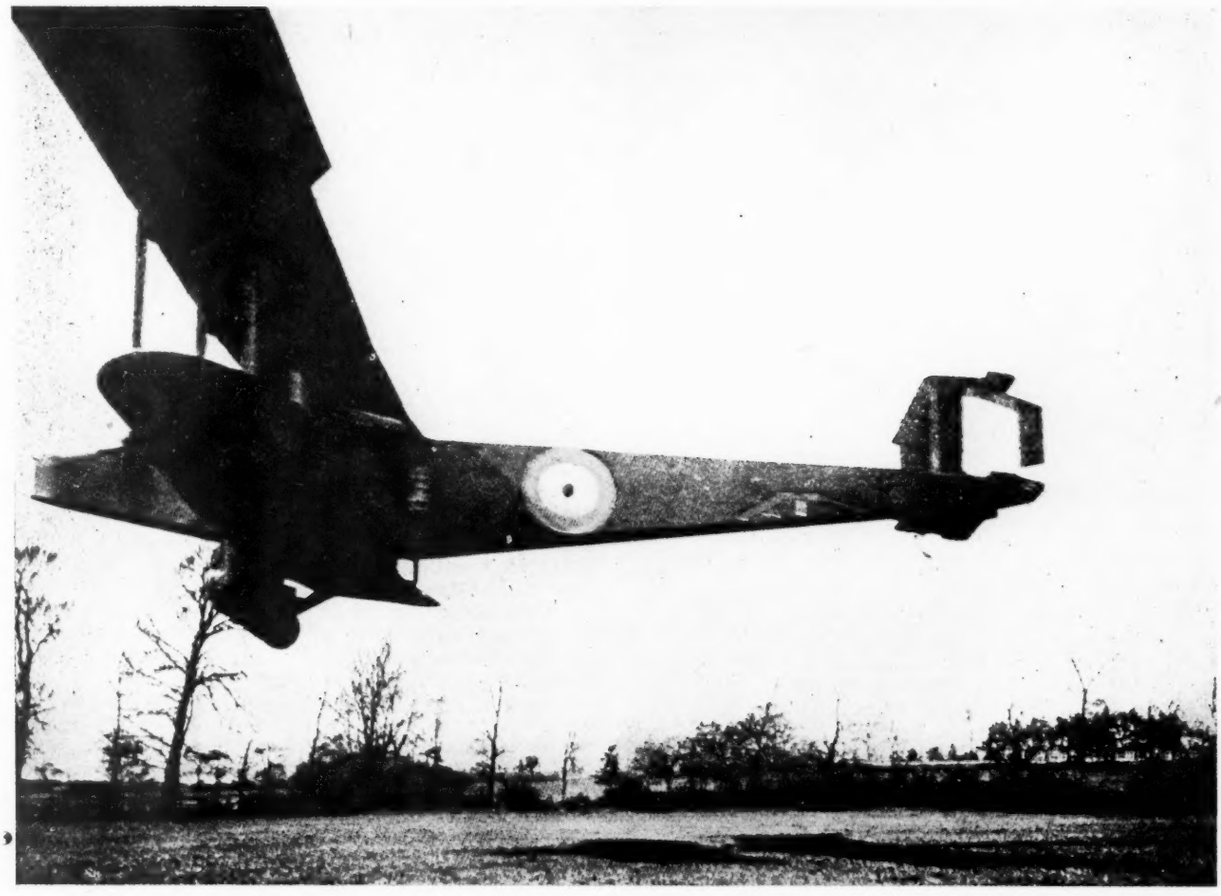
In the Caudron R-4 the Hispano or Renault engines are used. The landing-gear is made up of five wheels, a set of two each under each engine and one small fifth wheel under the nose of the fuselage.



The Voisin (French)

The Twin Caudron is a bombing machine, equipped with two 110-hp. LaRhone engines. The 1914 model was the first twin-engined machine ever built.

Caudron Twin Tractor Biplane (French)



Handley-Page Bomber in flight (British)

Voisin Pusher Type of Bombing Plane

The Voisin of 50-ft. span carries a useful load of 1000 lb. The maximum speed of 80 m.p.h. and climbs 6000 ft. in 15 min. It is powered with a 150 to 200-hp. Renault engine, and has a cruising radius of 4 to 5 hr. The Voisin has no fuselage. It has a balanced rudder and a balanced elevator carried on four tubular outriggers, which terminate in a vertical knife-edge. There is no horizontal fin. The gunners sit very far forward.

Various engines are used: the Peugeot, the Renault and the Salmson. A small cannon and a machine gun are carried. Both pilot and gunner sit in front of the engine. The machine gun may be fired forward and backward over the upper plane.

Handley-Page British Bomber

This is a very large machine (in the same class as the Russian Sikorski, the Italian Caproni and the giant Curtiss boats. Wing spread, 97 ft.; length, 47 ft.; and height, 15 ft. Chord, 9 ft. 6 in.; gap, 9 ft.; no stagger and no sweepback, a small dihedral, and an angle of incidence of 3½ deg. It carries sufficient fuel so it can stay up from 10 to 12 hr. Its gross weight is about 13,000 lb. and it carries a useful load of a little over a ton. Its maximum speed is about 88 m.p.h. and it will climb 10,000 ft. in 30 min. Powered with two 450-hp. Rolls-Royce engines. All-wood fuselage with passenger compartments below and a gunners cockpit in the nose.

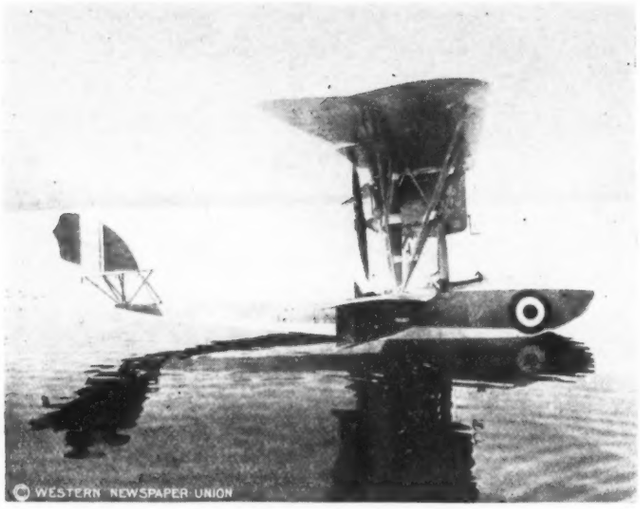
In spite of its size, the machine has been a great success, and it is to be expected that even larger machines of this character will be manufactured.

Caproni Triplane with Three Engines

It is equipped with three 200-hp. Fiats or Isotta-Fraschini engines, two located in the tractor position at the front of the fuselage and one pusher at the rear of the pilot's nacelle. It carries about a ton and a half. Next to the Curtiss triplane boat it is the largest triplane that has ever been built and successfully flown. It has five sets of struts on either side of the engines. The planes have practically no stagger, no dihedral and no sweepback. The empennage is very wide but has a small chord, and the elevator is a single narrow tail-flap with three balanced rudders above it. The landing-gear is composed of four pairs of wheels, one set under each fuselage. The fuselages are very long and only about half as deep as the gap. They are located just under the middle wing panel.

An unusual form of skid prevents the machine from turning over when landing. The machine is used for bombing and has a very large cruising radius.

Burgess U-2 Hydroaeroplane (American)



Macchi Flying Boat (Italian)

Flying Boats

BURGESS "U-2" NAVY SEAPLANE

The length over all is 30 ft. 5 in.; the width, 46 ft. 9 in.; height, 11 ft. 2 in.; chord, 6 ft. 3 in.; gap, 6 ft. Its supporting area is 574 sq. ft. The weight, when empty, is 1800 lb.; its live load 600 with a 100-hp. Curtiss OXX engine. Its low speed is 48.3 m.p.h., its high speed 75.2 m.p.h. It will climb 300 ft. per minute.

F. B. A. FLYING BOAT OF PUSHER TYPE

Equipped with a Gnome, Clerget or 130-hp. Hispano-Suiza engine. It has a span of about 46½ ft., a chord of 6 ft., and a gap of 5 ft. 9 in. It is 32½ ft. long. The engine is mounted well up between the planes on an inverted V frame. There are three sets of vertical struts on either side with a set of inclined ones at the ends.

The after part of the boat comes to a rather sharp point. The fins and rudder are mounted at some distance above the hull. The front of the hull is whale-shaped with room for pilot and passenger side by side in a forward cockpit.

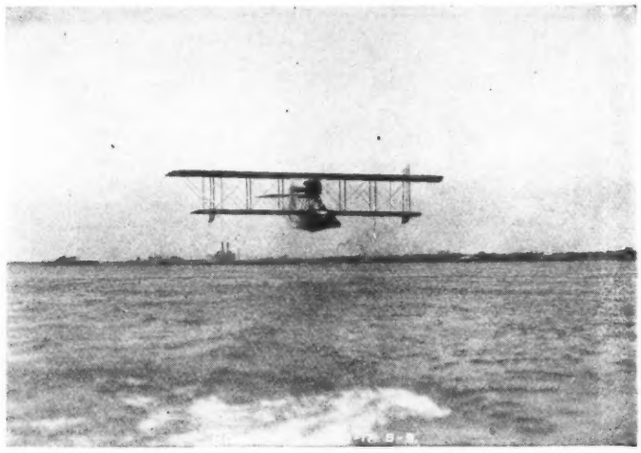
MACCHI FLYING BOAT (ITALIAN)

This boat has a very peculiar tail, Nieuport V-type of strut, is a pusher type and is very fast. Single-seater, fine construction, light weight, high-powered motor, quick climber. Head resistance slight. Struts and interplane bracing similar to Nieuport. Isotta-Fraschini engine. Over all dimensions: span, 39 ft. 4 7/16 in.; length, 27 ft. 3 in.; height, 9 ft. 10 1/16 in.

ARMSTRONG-WHITWORTH (90-HP. R. A. F. ENGINE)

Two-seater, tractor stick-controlled biplane school machine. Aspect ratio, 7. Dihedral at the top, 3½ deg.; at the bottom, 2½ deg. Stagger, 1 ft. 11.6 in., a chord of 5 ft. 8.3 in., gap 5 ft. 10.9 in., and angle of incidence 2½ deg. It is equipped

Löhner Flying Boat (Austrian)



A Curtiss Flying Boat (American)

with R. A. F. 90-hp. air-cooled engine, which at 1700 r.p.m. drives a four-bladed propeller of 9-ft. diameter, 10-ft. pitch. It carries a military load of 80 lb., a human load of 360 lb., total load of 440 lb. The weight hp. ratio is 22.8. Span, 40 ft. Over all length, 28 ft. 9 in. It will climb 10,000 ft. in 49 min., and has a speed of 72 m.p.h. Total weight, 2050 lb. The air endurance is 3 hours. It consumes 9.3 gal. of gasoline and 3.3 pints of oil per hour.

Length of run to unstick, 85 yards. Length of run to pull

Ago (an Austrian flying boat)

up (engine stopped), 120 yards. Single stick control. It will climb 12,300 ft. in 78 min.; rate of climb 75 ft. per minute.

AGO AUSTRIAN FLYING BOAT

This is a two seater sea-going fighter. There are no wires employed in the structure of the wing cell, which is composed of two cross-networks consisting of a front spar and a rear spar and of adjacent struts in inclined planes connecting the spars. The struts are of steel tubing with a fairing of laminated wood with good streamline effect.

The span of the upper plane is 8 m., the lower 7.38 m., and the chord for both planes is 1.50 meters. The length over all is 7.62 m. It is powered with a 218-hp. engine.

The carefully stream-lined shape of the hull and complete covering of cables and control wires are designed to decrease head resistance as much as possible.

AUSTRIAN LÖHNER FLYING BOAT

In this six steel struts are placed on either side, and, two by two, are connected in transverse planes with steel tubes. The upper plane span is 9.70 m., the lower span 7.20 m., the chord of the upper plane 2.70 m., that of the lower 2.20 m. The length of the hull is 12.50 m. The capacity for carrying bombs is 400 kg.

It is equipped with a 300-hp. Austro-Daimler twelve-cylinder V engine.

Tubing in Airplane Construction*

Manipulation of Tubes and Design of Tubular Structures for Aircraft

By A. G. Hackett

THE possibilities of tube manipulation, such as butting, tapering, drawing with taper gage, expanding, flanging, bending, lapping, etc., are becoming better understood. Some designers, however, while recognizing the usefulness of these different operations, still ask for what is not commercially possible, because they fail to make allowances for the alteration in the thickness of the tube which will occur as the result of such operations. For instance, if the diameter of a tube is increased the thickness of the wall is reduced, and if decreased in diameter the thickness is increased. Again, if a tube is flanged, the flange will not be of uniform gage, but will decrease in thickness as it increases in diameter.

A section of a bent tube cut from an F.2.B. undercarriage "V" strut shows that the gage of the tube has, by bending, been reduced on the outside of the curve from 0.061 in. to 0.048 in., and increased on the inside from 0.061 in. to 0.072 in. The thinning of the tube would cause it to break if it had not been properly annealed; and, further, if proper mandrils had not been used, or the tubes had not been filled with suitable material, a series of "puckers" or "corrugations" would have been formed on the inside of the bend. Where proper thickening up of the wall along the inner curve takes place in bending the bent portion of the tube is the strongest, but if "puckering" takes place this point becomes the weakest.

Bending is sometimes carried out with steel tubes in the hot state, but where strength is required this is bad practice, as by heating the tube is rendered much weaker than it would be if bent in the cold state. Of two "V" struts, one bent in the hot and the other in the cold state, and the same weight being applied in each case, it will be seen that the tube bent while hot has been distorted much more than the other.

Tubular Joints

Generally speaking, structural work for aircraft purposes is to-day carried out by means of sockets placed in suitable positions and arranged to receive the ends of the various tubular cross-members and bracings. These tubes and sockets are connected in three or four ways, namely:

By brazing.
By silver-soldering.
By soft-soldering.

Sometimes the sockets or lugs are dispensed with, in which case the cross-tubes are mitered and welded direct to the main tube.

The latter method is not advisable except in very rare instances, as any operation involving great heat is dangerous, owing to the weakening which results from the annealing or perhaps burning of the steel.

Another method is sometimes employed in which the cross-bracings are connected by means of a hinge joint to a sleeve on the main tube (*i.e.*, a trapped end tube with a nut and bolt).

Of types of lugs used in aircraft structural work, perhaps the most common is the lug made up by one long sleeve, with two branches mitered and welded on. Into and through these the main and branch members are fitted, and are held there, preferably, by soft-soldering and pegging. Another form of lug is made in two halves, pressed to shape, trimmed to depth, and welded along the joints. A wiring plate may be included. A three-way lug, with double wiring plate is common.

*From a paper read before the Aeronautical Society of Great Britain.

It will be useful to give the results of some comparative tests made on these various methods of jointing tubular structures, but before doing so we would remark that, in a paper like this, only the fringe of the subject can be touched. Everyone who is in any way connected with the practical side of aeronautical construction will readily call to mind many other types of joints, each designed for a special purpose or to overcome a constructional difficulty.

Soldering, Brazing, or Welding

Speaking from an experience of at least eight years in which we have been in touch with aircraft construction and design, we have met with a surprising amount of fluctuation in the respective popularity of soldering, brazing, welding, etc., for steel tube work, all these methods having been ruled out in turn, only again to find favor in certain quarters. This is partly due to the fact that machines designed by private manufacturers have been brought into great popularity, and the methods and designs of such makers adopted.

We have seen welding carried almost to excess and then almost abolished. Brazing has been boomed and then decried, and soft-soldering substituted for it—with a different type of lug or joint to allow for the reduced strength of the jointing material.

This, again, has been deemed unsafe, and silver-soldering, or hard-soldering, has risen into prominence, and to-day one hardly knows which type really is the popular one, as on the machines now being built for war purposes all styles and types of jointing may be found.

One has to realize that in all these methods the human element comes much into play. For instance, it is possible so to weld a joint that it appears to be sound, yet it may be a "fake"—metal being merely laid on and not fused with the surrounding parts. Or, again, the welded joint may be burnt, thus causing a dangerous weakening.

Similarly with brazing, it is possible with care to make a fine type of joint, but the probability is that in a certain percentage of cases overheating will take place and failure result.

We will now deal with the results of a few experiments recently carried out on certain of these types of joints.

Soft-Soldered Joints

Let us take soft-soldering first. In all cases the tests were made with a soft-solder composed of 60 per cent tin and 40 per cent lead—using "Fluxite" or some similar article as a flux.

Tubes of various gages were tried, but up to a certain point the strength of the soldered joint was such that the tube failed in tension without the joint giving way.

It was found that the strength of a soldered joint is much greater than it is generally supposed to be, and from experiments carried out, the clearance or thickness of the soldering material does not, between the limits of 0.001 in. and 0.008 in., make much difference, but for any components that can be guaranteed to size we would recommend as "thin" a joint as possible.

A striking example of a strong joint of the soft-solder type was given, an elevator "bloater" and its tube being selected for the purpose. The test on this joint was carried out in order to prove to the satisfaction of inspectors that the stipulated minimum clearance of 0.005 in. on the diameter was not necessary. In this particular case the elevator lever (or

"bloater") was held stationary while a torsional load was exerted on the tube. The result showed that the tube twisted and buckled without affecting the soldered joint.

One of the chief arguments against the use of soft-solder is the reduction in strength resulting from vibration, it being claimed that this form of joint will not sustain a vibratory load nor a series of shocks. This may sometimes be right, but even under these conditions a very satisfactory result can be obtained if the sweating is done thoroughly and well, and added strength is given if the joint be "pegged."

Tests on Soldered Joints

The writer recently carried out some experiments on what may be termed a "tup-testing machine" for soldered and brazed joints. It will be noted that the rising and falling tup or hammer is actuated by a bell crank lever, worked by a "sudden-drop" cam rotating in the direction of the arrow. The dead load on the tup shaft can be varied by means of the sliding weight. This consisted in fitting a tube into a lug or socket and then tapping—or "tupping"—it on the end to try and drive it further into the socket. A standard drop of 4 in. was arranged.

It was at first thought that the effect of the "tup" action would be to quickly rupture the joint, but to our great surprise the joint held to such an extent that we found it necessary during the test to increase the load from 10 lb. to 24 lb. The following are the details of the test:

Size of tube: 1 in. outside diameter by 18-gage.
Depth in socket (or lap): ½ in.
Thickness of solder: 0.005 in.
Number of blows: 113,500 with 10 lb. weight up.
Further number of blows: 64,000 with 24 lb. weight up.

At this stage the joint showed signs of giving way, so it was decided to apply a tensile test to see if the repeated blows had in any way deteriorated the solder. To our surprise the tube did not pull out until a load of 5.2 tons had been registered, giving the excellent result of 3.31 tons per super inch on the solder lining.

It may be urged that these results are not a fair basis on which to reckon, as they do not represent the ordinary work of the average operative. In answer, we would say that these results were all obtained from test pieces sweated by different operatives, in some cases being the work of girls with about two months' experience.

It may be possible to work out a formula to arrive at a basis for designers of soft-soldered joints, but even here, as in all calculations relating to structures, other factors have to be taken into account. For instance, a joint may be quite strong enough if in a 1 in. by 20-gage tubular joint the solder reaches to a distance of ½ in., and working on this basis it follows that the same distance for a 2 in. diameter tube of the same gage would be correct, but no one would be satisfied with this, and would naturally double the length of socket to meet the increased diameter.

Generally speaking, it may be taken for granted that with ordinary care, and with a good quality of soft-solder, a joint can always be made to withstand a shearing stress of 2½ tons per super inch on the solder itself—provided (and this is the crux of the whole matter) that the articles are well tinned and cleaned prior to the operation of sweating.

Choice of Sweating Apparatus

As regards the apparatus for sweating, different people will have a different choice, but having tried soldering irons, blowlamp, coal-gas jets, and hydrogen flame, we have found that the three latter are about equal, and each is better than a soldering iron alone, but this latter is necessary for finishing in awkward corners.

Eventually the use of a simple electrical device will probably become popular for repetition work.

As previously mentioned, this means of connection still has many adherents. There is, however, a great disadvantage attached to it, viz., the risk of burning the tube owing to the intense heat necessary. That this burning and consequent weakening does take place can be easily shown by the results of tests carried out by us on a cantilever testing machine.

The tests were upon tubes which had been fixed into sockets and brazed or soft-soldered, and showed the decided disadvantage of the brazed joint from the standpoint of strength.

A further series of tests was carried out on the alternating stress machine, and these results were similar.

Another point may be mentioned with regard to these tests. In one test the result was poor in comparison with the others. This joint was "faked," the tube and socket being left dirty and improperly tinned, in consequence of which the soldered joint had no "life." Even under these conditions the joint held for 75,130 revolutions, as against about 4000 for the brazed joint. At this point the socket failed, due to the insecure fixing of the tube.

Another peculiar feature of this test was the heat generated in the brazed tubes due to the constant working of the molecules. The tubes commenced to warm up almost immediately, and, before they broke, the temperature of the tubes near to the points of fracture (*i.e.*, near the socket) was about 120 deg. C., sufficient to cause the charring of any adjacent wood, whereas the soldered tubes remained quite cool until the last few minutes prior to fracture.

We are quite aware that in many places on aircraft structures brazing is permissible and good, but where any weakening of a member is likely to cause disaster, brazing should be carefully avoided.

Silver Soldering or Hard Soldering

The foregoing remarks as to brazing hardly apply to silver-soldering, as by this method a strong joint can be obtained without undue heat. We are not in a position at the moment to give any comparative figures of tests, but we should say that from the standpoint of tensile strength, silver-soldering is higher than soft-soldering, and very near to that of brazing. The heat necessary to perform the operation is lower than for brazing, and it is not likely to weaken any members if reasonable care is used. It is, however, a longer process, and the material used is very costly.

We may well ask ourselves, in these days, where we should be without some form of autogenous welding. The thousand and one articles that are built up of sheet metal welded together speak for themselves, and make us wonder how we ever got on without this useful engineering process.

Still, welding has its limits of usefulness, and if these are exceeded danger may be near.

In the early days of aeronautical engineering welding was often used in places and on parts where to-day it is "taboo," and such a method as welding tube to tube has dropped to a great extent out of favor, having been superseded by the more costly but better and safer engineering practice of jointing by means of machined or built-up tubular sockets.

Welding—by whatever means it is done—is always open to a certain amount of doubt, and though there are innumerable cases where this doubt as to the strength of a point is well covered, yet, owing to the hidden nature of the defects of welding and the possibility of burning and oxidization, present-day designers avoid it in any important member of an aircraft structure.

A most important rule introduced during recent years has been the suitable annealing of welded joints, and this rule should be adhered to whenever possible. Many will have noticed the brittleness of a welded joint before annealing or normalizing and the malleability of the same afterward.

On this point the writer discovered within the last few months a rather strange fact. We had occasion recently to make up some small lugs in which it was found that a certain amount of shortening took place as the result of the welding on of the arm. We have since noticed this shortening in other tubes, some of quite considerable length, where various fittings have been welded on at intervals, and so far we have not arrived at a satisfactory explanation.

Notes on Welding

The easiest method of welding is the butt joint, *i.e.*, when two tubes are placed end to end and joined together to form one length or mitered together to form one piece. In such a case the surfaces to be welded are readily accessible, and the flame has freedom for doing its work.

A more difficult type of welding is that necessary when one tube has to be mitered to the outside of another tube, as

when forming a "T" lug. In this case the easily-melted end of the one tube has to be united to the outside surface of the other, and anyone who has had experience with welding will know how much more difficult it is to attack the hard outside skin of a tube or sheet than it is the edge.

In order to prove this point we carried out tests on tubes measuring 1 in. outside diameter by 20 gage, and 1 in. outside diameter by 16 gage—some being butt welded and others having an interposed tube of about the same diameter, to which the end of each tube was welded.

Comparative tests were made on a cantilever tube joined to the main member by welding, and a similar type of leading was also tested for a lug, with the tube fixed in place by welding.

The following were the results: Welded direct to tube, 335 lb.; welded into socket, 365 lb.

Welding is often harshly criticized as regards its ability to withstand vibration, but even in this respect we have found striking instances where the tube has broken before the joint.

Some time ago we tried an intermittent shock and vibratory test on a machine which gave a series of vibrations to the tube, the blows due to the "peg-cam" being 1400 per minute. In some cases the tube broke off without the welded joint suffering in any appreciable manner.

As regards welding of any description to be done on tubing, we do not advocate the use of tubing made from steel too high in carbon. A low carbon steel gives the better result, and it is also most essential that the phosphorus content of both tube and welding wire shall be low.

Wherever possible, we would suggest that the welding on of hinges and sockets to a main spar or post be avoided. To slot a tube, or soften it by welding, is unwise, and in place of any fixtures that at present demand such operations we recommend a sweated and pegged fitting.

In support of this some experiments were carried out by our company in order to convince some of our friends of the advisability of following the course we have suggested. In one case a wiring lug was fixed on a main spar by welding, and in the other by sweating and pegging. Alternating tests on these tubes gave the following results: Welded, 5190 revs.; soldered, 8800 revs.

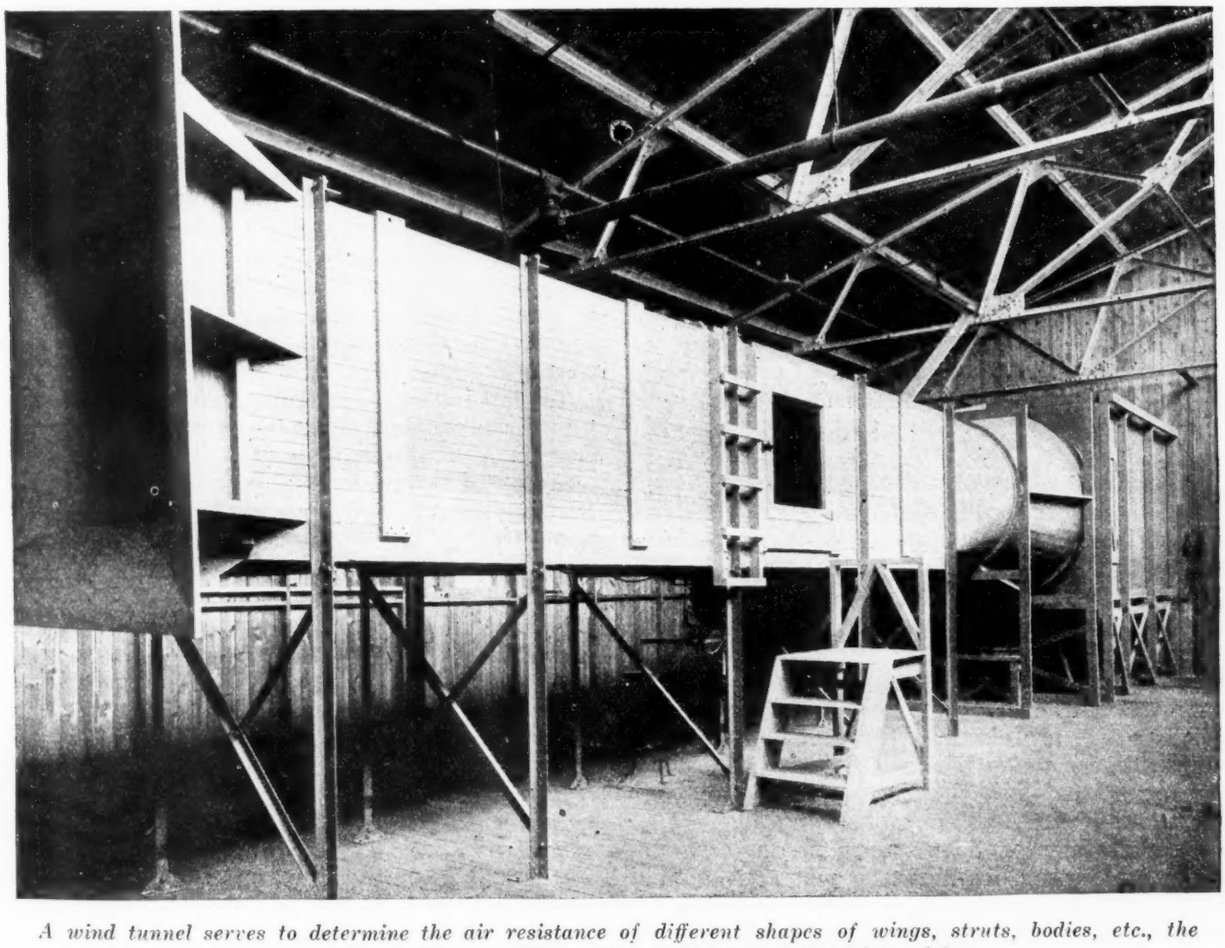
Rust Prevention

One further point remains to be mentioned. It is well known that a long life for any modern aeroplane is not expected. The present necessary wastage in aircraft is such that the question of internal rust and corrosion of the steel work is not of serious moment. The time is coming, however, when such matters will have to be seriously considered. For any post-war machines—especially if designed for general passenger traffic—the question of the length of life of all parts will be one of primary importance.

We have experimented with two or three methods of preserving from rust and corrosion, with fairly satisfactory results, and in the case of airship framework, subject as it is to salt water influence, we have used with fair success the "Cosletizing" process.

For soldered work, such as rudder and fin frames, we have instituted at our works a thorough system of washing and brushing in hot soda water to remove all traces of the "fluxite" or the flux, and we think this is most essential.

In conclusion, we would say that "the last word" in tubes and tubular structures has not by any means yet been spoken. With the increase in the size of machines, the constant and ever-increasing shortage of seasoned timber, the extended use of machines in future years in hot climates, with all the climatic effects on timber, the "all-steel" machine will undoubtedly soon become a reality and a necessity, and consequently the subject of tubes and tubular construction assumes increasing importance.



A wind tunnel serves to determine the air resistance of different shapes of wings, struts, bodies, etc., the experiments being usually carried out by means of scale models

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The Vestibule School and Shop Training

THERE are apparently two or more sides to the training question just as there are, or have been, to all other questions which have come up so far in the history of the world. Some manufacturers find that the vestibule school, or its equivalent, serves best for them as a means of developing the skilled operatives whom they must add from time to time to their working forces and others find, or believe they find, that the best, or at least satisfactory, results are obtained through training new employees in the shop under the direction of production foremen.

The users of each system of training advance an array of arguments which, standing alone, would convince any casual observer and when set against the arguments for the other system would apparently leave little or nothing to choose between them.

There is one point—it is a more or less general observation, perhaps, but it seems to bear on fundamentals—which apparently indicates that the vestibule school or the training department is based on sound logic. In such a school the chief business of the one charged with the instruction is to teach, and the chief business of the one sent there for instruction is to learn.

In the production department, on the other hand, the chief business of the one who does the instructing is to insure and secure output and the instruction of the beginner is a secondary or minor consideration. The desire of the latter to learn is in a measure counteracted by the inability of the former to teach, either through lack of natural aptitude, which is often the case, or through lack of time, which amounts to the same thing in the end, so far as results are concerned. In the separate school, however, the two principal factors—the desire to learn and the ability to teach—supplement each other, and this fact would lead to the anticipation of desirable results which could not otherwise be obtained.

It would, therefore, seem logical to expect when other things are equal—and they usually are—that the training of the vestibule school will be more thorough and more quickly accomplished than that done by the shop method.

The Production Value of an Employee

A MANUFACTURER, in calculating the production value of a machine, considers what it will produce in quantity and quality per hour, per day and during a period of some considerable length. Many a machine has been discarded or has not been adopted even though its hourly output rate was high because its total output during a lengthy period was less than that of a slower machine which had the very desirable quality of regularity—of keeping everlastingly at it.

In calculating the production value of an employee the manufacturer is too prone to figure only on his output per hour or day. He is likely to overlook the fact—and in this day of labor scarcity and the high cost of labor turnover it is a most important fact—that it is not so much what an employee produces in one hour, in one day or even in one week, that counts, as what that employee produces during his working lifetime. And it is greatly to the advantage of the employer to see that the working lifetime of an efficient employee is as long as it possibly can be.

Human Efficiency and Working Life

It is the employer's duty to himself, to the employee and to all of us who make up the population of this now sorely tried world, to use all available means and methods of making the employee's working life not only as long as possible, but as efficient as it is long.

They have learned much in Great Britain, since

the war began, about the output capacity of male or female workers—about human efficiency and how to obtain and maintain it. They had to learn it or lose the war. In spite of increased hours of labor production fell off. They thought it was *in spite*, but they found it was *because*. They discovered that within certain limits, which were considerably below what had formerly been considered the possible low limits for maximum production, the lessening of the hours of labor per week actually resulted in an increased output. They learned some surprising things along this line.

They learned that the working lifetime of an employee is a production unit that must be used in figuring total output. They learned that this lifetime can be varied in length and in total average efficiency by the conditions under which the worker works and lives.

They learned that the worker's health is something that has a decided commercial value, that without healthful conditions in the shop and in the worker's home both the worker's and the employer's best interests suffer. They learned, as it was expressed in a summarized report of the British Health of Munition Workers' Committee, that "without health there is no energy, without energy there is no output," and we might add, without output there are no profits for the manufacturer.

Welfare work well done pays real dividends, and pays larger ones now than ever before.

A Scientific Headlight Law

IN New York State there now is a definite method, a prescribed legal procedure, for determining what is, or rather what is not, a glaring headlight. There is no guesswork about it; no opportunity for the local policeman or Justice of the Peace to exercise his own peculiar judgment as to what objectionable glare is, for glare is or isn't, legally, according to a fixed standard which has recently been announced by the Secretary of State under authority conferred upon him by an amendment to the State Highway law. It is possible to tell exactly in any given case by means of scientific measuring instruments whether or not the law is complied with.

For the first time in the history of headlight legislation, nothing is left to individual opinion, and this means that for the first time also car manufacturers, lens makers, dealers and car owners know, so far as one state at least is concerned, just what requirements they must meet and how they can positively meet them. A careful study of the New York law and the adopting of its provisions by other states should be strongly advocated by all with even the smallest interest in the matter.

Besides being entitled to congratulations upon being the first to standardize headlight requirements scientifically, New York may also be congratulated upon the manner in which the requirements adopted were worked out. They are not the result of the usual legislative methods of procedure, but of the research work and investigation of competent engineers. The Secretary of State, acting under the provisions of the amendment to the highway law, called to his assistance representatives of the Society of Automotive Engineers and of the Illuminating Engineering Society, who conducted a number of elaborate tests, as recorded in AUTOMOTIVE INDUSTRIES at the time, and finally put their recommendations into the form of specifications for standard headlight tests, which were adopted as official.

The progress toward scientific legislation and law enforcement indicated in this case is worthy of more than passing notice. When the law makers and administrators seek the help of those who know of what they speak, another ray of optimism is projected into the future.

School Teachers as Shop Workers

REPORTS received from a number of manufacturing plants indicate that a fairly large number of women school teachers prompted by patriotic motives or the desire to earn an extra bit of money during their otherwise idle months are seeking employment in industrial establishments as operatives to replace men who have gone into government service.

The kind of woman school teacher who would seek employment of this kind is very likely to prove to be a most excellent operative after a comparatively short training period. Certainly she would bring to the job a degree of intelligence above the average of those who usually fill it. While she works she should be able to produce at as high a rate as conditions would permit and by example, at least, should have a good effect on the others with whom she works.

She will work hard, as well as intelligently, while the job is new, at any rate, and while she works she will undoubtedly be an admirable employee. But she is a transient. She will go back to her old work as soon as the schools open in the fall. She must be replaced and therefore cannot be counted on as a regular contributor to industrial production. About as soon as the employer finds that she is an exceptional employee she will leave him unless he can persuade her that an industrial life will pay better than a life of teaching, and in some cases it might be not only possible but desirable to do so.

And here's a thought. With the possibility pretty definitely established as a probability that our industries will hereafter employ a much larger proportion of women than they did in the pre-war days, there are opportunities for advancement to positions of considerable responsibility, and proportionate reward, opened to women of the right caliber, to women who have executive ability added to the pluck and determination which prompted them to take up even, as they thought, temporarily, a radically new line. It seems highly probable that such timber may be found among the school teachers who are filling in their spare time by working as operatives in industrial plants. Consider them carefully, Mr. Manufacturer, with this in mind.

□ Latest News of the

Airplane Production Satisfactory

Senate Committee Finds Excellent Progress Being Made in West

DETROIT, July 10—Airplane production in the middle Western territory is proceeding satisfactorily. The Senate investigating committee, after leaving the middle West, was greatly pleased at the progress which is being made in the factories in Dayton, Detroit and other centers in this vicinity.

This feeling on the part of the Senate investigating committee is reflected largely by manufacturers who now feel that they have set their pace and that they can see daylight in the way of production in Liberty engines and planes.

The Packard Motor Car Co. still leads in the production of Liberty engines. This concern just fell short of 800 engines during June by a very small margin. Eight hundred was the goal which was set for this month.

The production at the Lincoln Motor Co. is second, with an average of very close to 17 per day. The ultimate capacity of the Lincoln Motor Co. with its newly designed equipment will be about 70 Liberty engines per day, and it is expected that this will be reached during the coming winter.

The Ford Motor Co. has fallen far short of the rather hasty prediction given by Henry Ford during the spring. At that time he stated in his interview given out in Washington that about July 1 the Ford Motor Co. would be producing 100 per day. This was realized to be impossible by those who had had experience in airplane engine production, and the fact that Ford is in production at all is regarded by them as a big accomplishment in spite of the fact that the production falls far short of the mark set by Henry Ford at that time.

The Ford plant, according to best estimates, is turning out 2000 Liberty engine cylinders per day, and is nearing a production of complete engines of 10 per day. This is, furthermore, a remarkable accomplishment in view of the fact that the production heads of the Ford Motor Co. have been largely concerned with rapid production of the Eagle boats, or submarine chasers; one of these was ready to launch on July 4, and they will soon be coming through in a constant string, and eventually at the rate of one per day.

The Marmon company is not yet in production on Liberty engines, but shortly will be. The tooling-up progress is being pushed rapidly, and parts of the engine are reported to be in production. The complete engines, however, are not coming out of the factory as yet, although it is a matter of but a few weeks before the Nordyke & Marmon Co. will be added to the list of Liberty engine producers.

The Cadillac Motor Car Co. is now in production on complete engines. This concern which was one of the first to conquer the difficult connecting-rod manufacturing problem on the Liberty engine, is now turning out, in connection with Buick, complete sets of parts and assembling them. The rate of production is not stable enough to set a fixed average per day, but soon will be, and probably in a few weeks a production of five per day will be reached. This will be increased rapidly as time goes on, so that this concern will be a fairly large producer of Liberty engines late in the fall or early in the winter.

The Trego Motors Co. is turning out a complete Liberty engine every day or two.

There have been reports that the Navy has taken a large percentage of Liberty engines. This is true, the percentage being estimated at from 40 to 60 of the total. With the rapid production of the De Haviland bombing plane demanding Liberty engines for equipment, the engine production will have to be speeded up to take care of both the navy and army demands. The Navy type has proved exceptionally satisfactory, and it has not been confronted with the problems of carburetion at high altitudes which has been one of the difficult kinks to solve in the Army plane.

The Liberty engine carbureter system on the Army types will have to be modified slightly for the extreme altitude. Advices have come from the staff of the American Expeditionary Forces to the effect that the carburetion system, particularly as concerns the gasoline feed, will have to be altered to eliminate fire danger due to spitting back while cold.

It has been practically decided to abandon all pressure feed of gasoline on the West front, due to the fact that a bullet through the gasoline tank renders the gasoline feed system inoperative and for this reason gravity feed will have to be substituted, or some other method which is not susceptible to destruction by punctures.

The Fisher Body Co. is pushing along rapidly with its plant and the 10 acres originally designed for have just about been completed. In addition, there will be more buildings added to take care of the enlarged battle plane production program.

The new plane which has been designated at the Packard plant under the auspices of the French Commission has been flown and has been declared a success. Captain Flachaire of the French Flying Corps, who has been in this country on propaganda work, giving exhibition flights with his Spad in different cities throughout the country, was one of those to fly the new type of machine and expresses himself as highly satisfied witht it. In fact, Captain Flachaire was able to successfully execute a tail spin quite close to the ground with the machine, after having been up only a short time. This is a two-seated battleplane particularly adapted to the Liberty engine and is a modification of the design which has proven highly successful with the Buggatti engine.

Passenger Car Tax May Be 10%

Treasury Department Submits Tax Proposals—Gasoline Impost Not Likely

WASHINGTON, July 10—It is probable that a 10 per cent retail sales tax on passenger cars will result from the tax recommendations made yesterday by the Treasury Department to the Ways and Means Committee.

It is unlikely that the proposal to tax gasoline will be taken seriously.

The car taxes suggested include both retail sales tax to "label the taxed article as a luxury and serve notice that the Government's ban is honest," and certain manufacturers or producers taxes, as follows:

Retail sales tax:
Twenty per cent on passenger cars.
Twenty per cent on trailers.
Twenty per cent on truck units.
Twenty per cent on motorcycles.
Twenty per cent on tires for automobiles, motorcycles and bicycles.

A license tax on passenger cars based on horsepower as follows:

Producers or manufacturers tax:

Twenty-three h.p. or less	$15
Twenty-four to thirty h.p.	25
Thirty-one to forty h.p.	40
Over forty h.p.	50

To be paid by wholesale dealers:
Ten cents per gallon on gasoline.
To be paid by consumers:
Twenty-five per cent of the wages paid to domestic chauffeurs.

The Ways and Means Committee was both startled and amused by the suggestions. While no definite conclusions were reached following a day spent in going over each item mentioned, it was plain that the majority of the members are in favor of a high increase in the tax on passenger cars, probably to 10 per cent.

At the same time the majority are against a tax on gasoline for the reason that numerous inequalities would result. It was pointed out that motor trucks performing valuable services in relieving transportation and passenger cars engaged in utilitarian work would be unjustly taxed. If a scheme could be devised so that gasoline used for pleasure purposes could be taxed separately, it would find favor but since this plan is practically impossible, it is felt unwise to place a wholesale tax on it.

The Committee returned the list to the Treasury Department with a request for an estimate of the taxes it would yield. It is believed that in view of the greatly decreased consumption that would accompany such exorbitant taxes that the Treasury Department will find it difficult to furnish an accurate estimate of the revenue that would result.

Automotive Industries

Reclassify Freight; Rates Changed

Would Increase Passenger Cars 10% and Reduce Trucks—Permit Mixed Loads

NEW YORK, July 10—Under the Consolidated Classification, which is now in print and ready for filing before the Interstate Commerce Commission, freight rates for passenger cars will be increased 10 per cent on Western railroads, and rates on trucks will be considerably reduced.

Heretofore passenger cars and trucks have been placed in the same classification by railroads and have paid the same rates. Under the Consolidated Classification these are separated, and whereas trucks heretofore have been rated double first-class rates in l.c.l. lots and first-class rates with a minimum of 10,000 lbs. in c.l. lots, under the Consolidated Classification rates charged will be 1½ times first-class rates l.c.l. and for c.l. second-class, with a minimum of 12,000 lbs. for a 36-ft. car.

If the Consolidated Classification becomes effective, rates on passenger cars will be the same as those at present prescribed in the Official Classification on l.c.l. shipments. This is 2½ times first-class at actual weight, with a minimum charge on 5000 lbs. each at first-class rate; double first-class rate when crated and 1½ times first-class rate when boxed. Rates for c.l. shipments are increased to 110 per cent of first-class with a minimum of 10,000 lbs. This represents an increase of about 10 per cent.

A further change proposed by the Consolidated Classification would permit the mixing of various articles at carload rate. When this is done the carload will be rated at the highest rate of any commodity in it, with the carload minimum rate the highest provided for any article in the carload.

Hearings on the new classifications are to be held in Boston, Aug. 1; New York, Aug. 8; Chicago, Aug. 12, and in Omaha, Portland, San Francisco, Denver and Fort Worth at subsequent dates and at Atlanta on Sept. 19.

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Tracy To Conduct Official Fuel Consumption Tests

NEW YORK, July 10—Joseph Tracy, consulting engineer, has been appointed consulting engineer of the Bureau of Oil Conservation, United States Fuel Administration by W. Champlin Robinson, who is Director of Oil Conservation. Mr. Tracy will conduct sanctioned tests of automobiles, motor trucks, and other apparatus for the purpose of securing greater fuel economy. These tests will be sanctioned by the Bureau of Oil Conservation. This practical testing work is being concentrated under the complete direction of Mr. Tracy. The definite plans as to the exact nature of road tests have not been decided upon.

—

Ford Will Reduce Production

DETROIT, July 9—Nothing has been definitely decided upon but indications point to a sharp cut in the production of passenger cars and trucks of the Ford Motor Co. It is expected that the output of the factory will be brought down to 375 passenger cars and 450 trucks a day by Aug. 1. This is necessary because of the immense amount of government work handled at the Ford factory. It is reported that the government has suggested this action. The company is now turning out only 1000 cars daily as compared with 1600 less than 30 days ago. This last figure represents only 50 per cent of its greatest normal production.

—

Government Control of Sulphur

WASHINGTON, July 10—The War Industries Board has taken over control of production and distribution of sulphur materials and W. G. Woolfolk has been made chief of the section in charge of sulphur and pyrites. Sulphuric acid is used to a certain extent in the automotive industries for pickling baths but it is not anticipated that there will be any difficulty in obtaining this material. Sulphur is an indispensable article in the vulcanization of rubber, about one-fifth of the weight of crude rubber being required. It is understood that the rubber industry, which is looked upon as an essential industry by the War Industries Board, will be protected in its requirements.

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Restrict Graphite Crucible Imports

WASHINGTON, July 11—The importation of graphite crucible has been restricted by the War Trade Board after July 15. The action was taken when it was shown that there were adequate supplies in the country.

—

Marmon and Hall Going to France

DETROIT, July 11—Major Howard Marmon, Colonel Hall and Charles H. Willard, chief engineer of the Aeromarine Plane & Motor Co., will form a Government commission to obtain the latest military information on aircraft. They will leave shortly for France and England.

No War Revenue Tax on Exports

Treasury Department Rules Cars Shipped Abroad Cannot Be Taxed 3 Per Cent

NEW YORK, July 10—The Commissioner of Internal Revenue of the Treasury Department has ruled that manufacturers of automobiles can export cars without paying the 3 per cent War Revenue Tax which heretofore has been payable, and has virtually ruled that it is unconstitutional to tax any article which is exported from the United States.

The ruling is based on an opinion of the Attorney-General of the United States, which holds that the 3 per cent War Revenue Tax does not apply to articles sold in foreign commerce by any one of the four following methods:

1—Articles shipped by a manufacturer to an agent in a foreign country and sold there by the agent;

2—Articles shipped by a manufacturer to a foreign purchaser to fill orders received by an agent in a foreign country;

3—Articles shipped by a manufacturer to a foreign purchaser to fill orders received by the manufacturer in the United States;

4—Articles shipped by a manufacturer to a foreign purchaser to fill orders solicited by mail and received by mail from a foreign purchaser.

Applies to Shipments to Foreign Lands

This ruling applies only to articles shipped from any state in the United States to a foreign country. The taxes apply, however, to articles sold in foreign countries by a manufacturer located in a territory or elsewhere in the United States other than in a state, and also to articles sold in commerce between the United States and any of its island or other possessions except the West Indian Islands acquired from Denmark.

In explanation of the decision, which is supplemental to Regulations No. 44 approved May 31, 1918, it is pointed out that whereas Section 600 of the Act of Oct. 3, 1917, imposes a War Revenue Tax of 3 per cent on motor cars and other articles, Section 9 of Article 1 of the Constitution of the United States provides that "No tax or duty shall be laid on articles exported from any state."

The Treasury Department has issued in pamphlet form a revision and summary of its various rulings covering the 3 per cent war tax and referring particularly to Articles 1 to 10 inclusive.

New Rules Govern Export Licenses

After July 15 to Be Regarded As Having Been Used in Period of Validity

WASHINGTON, July 8 — After July 15, new rules will be operated by the War Trade Board governing the expiration dates of export licenses. On and after July 15, 1918, export licenses will be regarded as having been used within the period of their validity:

(a) If the through export bill of lading is issued and signed on or before the expiration date of the license and subsequent to Oct. 9, 1917; or

(b) If the ocean bill of lading is dated on or before the expiration date of the license; or

(c) If the dock receipt is dated on or before the expiration date of the license, and the ocean bill of lading covering the same shipment is dated not later than 30 days after the expiration date of the license; or

If the dock receipt is dated on or before the expiration date of the license and prior to July 15, 1918, and the ocean bill of lading covering the same shipment is dated not later than 30 days after July 15, 1918.

(d) If the railroad notice of arrival issued at the port of exportation is dated on or before the expiration date of the license, and if the ocean bill of lading covering the same shipment is dated not later than 10 days after the expiration date of the license; provided, that the provisions of this paragraph (d) shall apply only when the merchandise is exported on vessels loading at railroad docks, where dock receipts as provided in paragraph (b) cannot be issued by the vessel or its agents.

On and after July 15, 1918, shippers shall prepare and deliver to the railroad agent issuing a through export bill of lading one additional copy of such bill of lading, which copy will be mailed by the issuing railroad agent to the Bureau of Exports, War Trade, Washington, D. C., after there has been noted thereon the port of exit through which the shipment will pass.

Shippers who have goods in transit on through export bills of lading issued subsequent to October 9, 1917, and prior to July 15, 1918, and which goods have not actually cleared from the United States prior to July 15, 1918, must mail immediately to the War Trade Board, Bureau of Exports, Washington, D. C., a copy of such through export bill of lading, giving the port of exit from the United States as well as the number of the export license under which the shipment was made so that the War Trade Board may arrange clearance for such shipments.

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Studebaker Adds a Sedan

SOUTH BEND, IND., July 8—The Studebaker Corp. has added a sedan to its series 19 models, and this will be fitted to both the four and six-cylinder chassis, the four listing at $1,685 and the six at $2,185. There is practically no difference in the two bodies, both seating five passengers. Upholstery is high grade cloth laid in parallel pleats, and equipment includes a dome light, silk roller curtains, door locks and a three-piece windshield with adjustable visor. The finish is Studebaker blue with the chassis and upper half of the body black.

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Ferro-Silicon Output Increases

WASHINGTON, July 6—Increased production of ferro-silicon, electrodes, phosphorus, chlorine and abrasives has resulted through a general supervision of the electrical power provided by the Niagara Falls, according to a report just issued. The supervision has extended over all the power generated or imported by the Hydraulic Power Co. and the Niagra Falls Power Co., and which has been distributed chiefly to war industries. Of all the power available, the war industries have received 85.29 per cent.

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Permit Magnesite to Come In

WASHINGTON, July 5—Importation of magnesite will be allowed under the new War Trade Board backhaul provision, which permits the importation of magnesite when shipped return cargo from Europe and the Mediterranean coast of Africa, and when shipped from convenient ports where loading can be done without delay. Importations of maganese ore from Asia and Australasia have, by another ruling, been prohibited as to ocean shipments made on and after July 20, 1918; and, to make this ruling effective, all outstanding licenses for the importation of manganese from those countries have been revoked as to ocean shipment on and after July 20, 1918.

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M. A. M. A. Washington Office Closed

WASHINGTON, July 6—The office of the Motor and Accessory Manufacturers' Association in this city has been discontinued, as forecast in last week's issue. A. W. Copland, who was the special representative for the association here, and who will continue as chairman of its War Service Committee, has returned to his business duties in Detroit. Mr. Copland is the head of the Detroit Gear Co.

Production of Coal Down Slightly

Bituminous Drops 5% From Last Week, But Is Ahead of Output Last Year

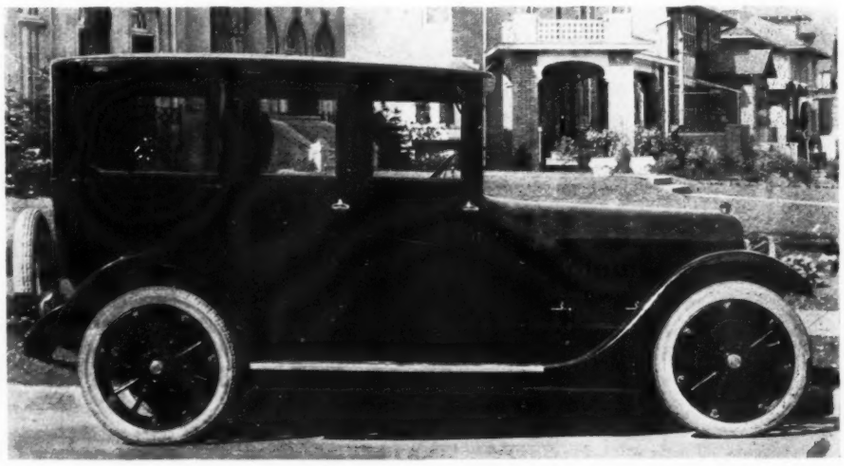
WASHINGTON, July 6 — Bituminous coal production for the week ended June 22 was 12,016,000 tons, a decrease of 610,000 tons, or 5 per cent less than the preceding week, and an increase of 701,000 tons, or 6 per cent, over the corresponding week of 1917. Despite the sharp decline compared with the preceding week, the Fuel Administration indicates that the mines have adjusted their stride to a basis of 12,000,000 tons per week, and that this output is not far below the average necessary to provide the tonnage to meet the estimated requirements of the country. Falling off in production was reported from all producing centers, Ohio and Alabama decreasing the most.

Anthracite shipments for the week of June 22 amounted to 41,170 cars, a decrease of 700 cars from the preceding week, or 1.9 per cent loss.

The Fuel Administration states that the record production of 12,626,000 tons for the week ended June 15 was accomplished without any enlargement of the working forces at the mines. Output was increased by individual efforts of the men.

During this week the mines operated up to 79.7 per cent of their full time output. The percentages of full lost time are accounted for as follows: Car shortage, 10.9 per cent; labor shortage, including strikes, 4.7 per cent; mine disability, 3 per cent; no market, 0.3 per cent; all other instances, 1.4 per cent.

Insufficient car supply hampered production in Illinois, Ohio, western Pennsylvania, West Virginia and the western states. Illinois reported labor shortage. Car shortage based upon full time capacity ranged as high as 20 per cent in some districts.



Type of sedan body which has been added to the Studebaker line. It is supplied on both the four- and six-cylinder chassis

Coal for Passenger Cars 25%

Use to Be Restricted Regardless of Quantity Stored—100% for War Work

WASHINGTON, July 8—Passenger car makers will be allowed to use only 25 per cent of the coal allotment of the 1917-18 period in the 1918-19 period, regardless of the quantities of coal they have purchased now and stored away.

Manufacturers engaged in war and passenger car manufacture will receive 100 per cent coal supply for the war work, but will be allowed the 25 per cent allotment only for passenger car manufacture. Many of the manufacturers have made expenditures of money, used considerable space for storing large quantities of coal this spring, in the anticipation that the Fuel Administration would allow them to use all the coal they buy now for passenger car manufacture next winter. The above ruling was made by F. W. Noyes, Director of Conservation of the United States Fuel Administration, to AUTOMOTIVE INDUSTRIES to dispel these hopes. It was pointed out to the Fuel Administration that:

(a) The Administration requested manufacturers to buy their coal now to relieve the railroads next winter.

(b) Many manufacturers heeding this request are making expenditures of money and using important factory space to store the coal.

(c) Many manufacturers are securing enough coal to provide them with a 100 per cent allowance for passenger car use.

(d) Other manufacturers are not heeding the request of the Government to buy coal now, and it would be a great injustice if the Administration refuses to allow those manufacturers with foresight, who buy their 100 per cent coal needs now, to use the full coal allowance next winter.

(e) It would be a great injustice to the foresighted and patriotic manufacturer who buys his coal now and who devotes an outlay of money and use of space for that purpose to be forced next winter to either have his coal lie idle or be obliged to divide it with those manufacturers who do not display the foresight and are not willing to spend the money or use the necessary space to buy coal now.

Regardless of the injustice, and regardless of the fact that manufacturers that buy their coal now are only heeding the United States Fuel Administration requests, the above rulings were made by Director Noyes.

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Benford Develops Golden Eagle Spark Plug

A new design of spark plug, especially adapted for use on tractor and truck engines, has been placed on the market by the Benford Mfg. Co., Mount Vernon, N. Y. It is of substantial construction, and an extensive test, covering 17,000 miles in a tractor engine, has shown it to be well adapted for the purpose for which it was designed. The Golden Eagle plug is being made in several different sizes, viz., ⅞-in. regular; ¾-in. regular; metric, ⅞-in. long, ½-in. long; ¾-in. long and ½-in. extra long. This large assortment of sizes permits of meeting the requirements of all different types of engines.

The Golden Eagle plug is of the mica-insulated type. There is an inside layer of sheet mica, wrapped tightly around a tapered rod. By a special method employed, it is possible to wrap the mica tighter around the rod than is usually the case, and it is claimed that at least one-third more mica is gotten into the same space than by ordinary methods. This extra tight winding of the mica is claimed to absolutely prevent short-circuiting by oil. As is well known, when the mica is loosely wound, oil will seep into the interstices and soak through the mica core, thus short-circuiting the plug.

To the bottom of the tapered central rod is welded a pure nickel electrode, and a pure nickel side electrode runs from one side of the shell to the other, this latter electrode being curved around the central electrode in V fashion, the same as in the Golden Giant. The bottom of this plug is closed by what is generally referred to as a "baffle plate." There are four holes in this baffle plate, through which the combustible charge and the burning gas can pass in and out respectively. The object of the baffle plate is to keep oil out of the spark plug chamber, thereby preventing the plug from fouling. It is also claimed that the baffle plate confines the heat to the spark plug chamber, and that the resulting high temperature will burn any oil that may get into the chamber, thus making carbonization practically impossible. Only one gasket is used in the plug. This is 5/64 in. thick, and is made of copper. It is claimed to hold the strongest compression. Stock plugs will be provided with double lock washers. The retail price of the Golden Eagle plug is $2.

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First Wolverine Truck Out

DETROIT, July 8—The first Wolverine 1½-ton truck of the American Commercial Car Co. is expected on the market the last of this week. The retail price will be $1,825. The company was organized last year by H. C. Wiedeman and associates, who purchased a large manufacturing plant at the corner of Gratiot Avenue and the Detroit Terminal railroad, comprising about five acres of ground together with three large factory buildings and machine shop equipment.

Canadian Exports Need License

Individual Permits for Non-Canadian Products—Ban Graphite for 1918

WASHINGTON, July 8—Hereafter all shipments of articles of non-Canadian origin imported from Canada and Newfoundland will require individual import licenses similar to those required for imports from other countries. This ruling by the War Trade Board is made to prevent evasions of the general import regulations. Some concerns have been making sea shipments to Canada of restricted commodities, and then import through Canada by rail to the United States. Goods of Canadian origin will be granted entry but will require individual import licenses.

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WASHINGTON, June 28—The War Trade Board has modified the export conservation list effective June 28, 1918, as follows:

Individual licenses for the export of fuel have to be secured for marine engines and parts of more than 60 hp.

Individual licenses must be secured for the export of logs, including timber round, hewn, sawed, sided or square, and for lumber manufactured in all dimensions and sizes for commercial uses, including wood suitable for gun stocks, airplane propellers, blades, veneers, for airplane and hydroplane bodies, airplane and hydroplane frames and for ordnance construction, and for wood handles for tools necessary for war supplies.

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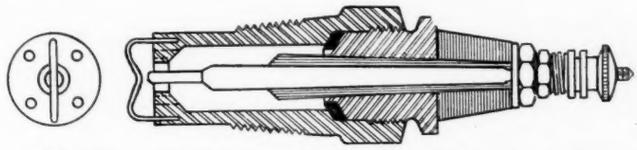
Ban Graphite for All of 1918

WASHINGTON, July 2—The importation of graphite or plumbago has been extended to be effective for the entire calendar year 1918 by the War Industries Board. Under the List of Restricted Imports No. 1 this restriction was made absolute until July 1 of this year, the possibility of importing not to exceed 5000 long tons for the remainder of the year being left open should investigation prove that stocks in this country were inadequate to meet the home requirements for the entire year. As a result of the investigation, it has been found that present stocks, together with the home production, suffice to meet requirements until well into 1919. The restriction has therefore been continued and the Bureau of Imports has been instructed to issue no licenses for the importation of plumbago or graphite for the rest of the calendar year.



Section showing construction of Benford Golden Eagle spark plug

Favor Government Airplane Plant

Congress Will Probably Pass Bill for $100,000,000 Aircraft Corporation

WASHINGTON, July 8.—The bill demanding the organization of a Government-owned aircraft corporation proposed recently by Senator Chamberlain, and told of in a past issue of AUTOMOTIVE INDUSTRIES, will probably pass Congress. This bill, which calls for the creation of a corporation directing production of aircraft equipment or materials will be formed under the laws of the District of Columbia with a capital stock of $100,000,000.

According to Congressman Kahn, one of the chief objects of the corporation will be efficient division of spruce to the Allies. Great Britain takes eleven twenty-fourths, France one-sixth, Italy one-eighth, and the United States one-fourth of the output, and it is believed that the corporation should be organized, and each of the Allies put upon debentures of this Government for the amount of lumber they are receiving from it so that when the time of settlement arrives nations will get returns from their salvage in proportion to the stock they are allotted in the corporation. The United States Government will at all times be the majority stockholder, and the minority stock it is proposed, will be sold to the various allied governments.

The corporation will to some extent purchase all the existing plants now manufacturing aircraft, but it is anticipated will in the main co-operate with existing plants rather than purchase them or build new ones.

The corporation, which will be under the control of the Aircraft Production Board, will be similar to the Emergency Fleet Corporation, and will function with regard to the production of airplanes as the Emergency Fleet Corporation operates in regard to building ships.

Congressional debate regarding this bill developed the fact that the Wright-Martin Co., Dayton, shipped 421 planes up to June 22, and sent out 36 carloads in one day from Dayton. Some of the congressmen, told by Congressman Kahn, that they were little "behind the time" endeavored to bring up the subject of the efficiency of the Liberty engine, and the results of the expenditures of the $640,000,000 appropriated last year for airplanes.

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N. A. C. C. Endorses Work of N. A. D. A.

DETROIT, July 10—At the regular monthly meeting of the National Automobile Chamber of Commerce, held here to-day, efforts of the National Automobile Dealers' Association to assist the government by reducing the amount of free service given by dealers were given the support of the chamber. Drive-aways from factories are increasing and the production of trucks has gone up 100 per cent. The following committee chairmen were appointed: Patents, C. C. Hanch (Studebaker); Motor Truck, Windsor T. White (White); Legislation, H. H. Rice (Chevrolet); Good Roads, Roy D. Chapin (Hudson); Traffic, William E. Metzger (Columbia); Electric vehicles, W. C. Anderson (Detroit); Handbook, C. H. Pelton (Maxwell); Exports, J. Walter Drake (Hupmobile); War Service, Hugh Chalmers (Chalmers); Standardization, C. W. Churchill (Winton).

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Reduce Airplane Mail Rate

WASHINGTON, June 29—Beginning July 15 the postage rate for airplane mail between New York and this city, now 24 cents per ounce, will be reduced to 16 cents for the first ounce and 6 cents for each additional ounce. This is a 6-cent rate, plus the usual 10 cents for special delivery. The reduction is expected to greatly increase the use of the air mail service.

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Six Deaths at Aviation Fields

WASHINGTON, June 28—Six deaths resulted from aviation accidents at the aviation fields in this country during the week ending June 15. Summary is as follows:

Barron Field, Everman, Tex	1
Carlstrom Field, Arcadia, Fla	1
Ellington Field, Houston, Tex	1
Kelly Field, San Antonio, Tex	1
Payne Field, West Point, Miss	1
Scott Field, Belleville, Ill	1

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Airplane Investigators Go to Dayton

WASHINGTON, July 8—Charles E. Hughes, Attorney-General Gregory and Assistant Attorney-General Fitts, who are investigating the aircraft situation, leave to-day for Dayton to gain first-hand information at the factories there.

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Solid Tires to Be Standardized

AKRON, July 8—At a recent meeting of the War Service Committee, Division of Solid Tires, the following classification of pressed-on solid tires was adopted tentatively:

Class "A" Permanent Standard	Class "C" To be discontinued Nov. 1919	Class "D" To be discontinued Nov. 1918	Class "E" To be discontinued at once
32 x 3½	32 x 2½	42 x 5	34 x 7
34 x 3½	32 x 3	34 x 6	34 x 8
34 x 4	34 x 3	42 x 6	40 x 8
36 x 4	36 x 3	42 x 7	34 x 10
34 x 5	36 x 3½		42 x 10
36 x 5	32 x 4		36 x 12
40 x 5	38 x 4		42 x 14
36 x 6	40 x 4		
40 x 6	38 x 5		
36 x 7	38 x 6		
36 x 8	38 x 7		
36 x 10	40 x 7		
40 x 10			
40 x 12			
40 x 14			

Although the above classification has not been finally adopted, it is entirely probable that it will be at a later meeting, the definite date of which has not been announced.

Deliver 4495 Planes to Government

All for Elementary Training—820 for Advanced Training Have Also Been Received

WASHINGTON, July 5—Four thousand four hundred and ninety-five elementary training airplanes were delivered to the United States Government by manufacturers in this country up to June 8. Eight hundred and twenty advanced training airplanes were delivered up to Jan. 8. This information, together with other data, was submitted to Congressman S. H. Dent, Jr., by Secretary of War Baker this week. The further information regarding aviation included: The average weekly production of advanced training planes during April was 22; during May, 45½; week ending June 8, 78.

To June 8, a total of 286 combat planes were delivered. The weekly average of this type of machine in April was 5; in May, 38; week ending June 8, 80.

More than 2000 Liberty engines have been delivered to the Army and Navy. The average weekly production in April was 96; in May, 143, and in the first week of June, 115.

Thirty-seven thousand two hundred and fifty machine guns were delivered for use on airplanes before June 8.

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Airplane Bombing Demonstrated

WASHINGTON, July 11—Airplane bombing, airplane bomb flares and other trench warfare was successfully demonstrated in an exhibit held here yesterday by the trench warfare section of the engineering division of the Ordnance Department. The display included salvos of grenades, barrages, drop bombs, trench mortars, high explosives, gas and pyrotechnic signals. A De Haviland plane equipped with two Liberty engines, dropped four demolition demonstration bombs from an altitude of 2000 ft. aiming at a target 30 ft. in diameter and striking within a radius of 200 yards each time. The bombs, which are one-fourth normal effectiveness, tore holes 10 ft. deep and 30 ft. in diameter

Airplane flare bombs used to light cities to be bombed were also exhibited. They are 36 in. in length and 8 in. in diameter and contain a parachute which suspends them in the air after they are released. They throw a light of 350,000 cp. over a radius of 2 miles. Flares used to guide night bombers to their hangars were also displayed and created a light as powerful as daylight over a radius of 300 yards. Various pistol rocket signals, used to guide or signal night bombers by throwing various colored lights carried by small parachutes into the air were shown. These are used by aviators on their return and at the hangars.

Another demonstration was of incendiary bombs, which, dropped from an altitude of 2000 ft., started huge fires in the fields.

Exports Show Drop of 22%

Figures for May, 1918, Only Half Those for May, 1917 —Trucks Increased

	1918 Cars	Value	Trucks	Value	Parts
May	2,801	$2,907,390	866	$1,958,603	$2,859,496
April	6,104	3,958,560	655	1,392,125	4,004,383
	1917				
May	6,725	5,189,980	1,764	3,216,620	2,715,796

WASHINGTON, July 10—Exports of passenger cars, trucks and parts during May amounted to $7,725,489. This is 22 per cent less than the April total and 48 per cent less than the amount exported during May, 1917. The chief drop came in passenger cars. Only 2801, valued at $2,907,390, were shipped during May as compared with 6104, valued at $3,958,560, during April. During May, 1917, 6726 cars, valued at $5,490,509, were shipped, which is more than twice as large as the May, 1918, figure.

Commercial car exports, on the other hand, showed an increase over the April figure. In May, 866 trucks valued at $1,958,603 were shipped as compared with 655, valued at $1,392,125, in April. The May total is smaller than that of May, 1917, when 1764 trucks worth $3,222,807 were exported.

One airplane was shipped as compared with 24 during May, 1917, and none in April. The value of airplane parts increased from $359,436 in April, 1918, and $513,104 in May, 1917, to $771,673 in May, 1918.

Of the 2801 passenger cars shipped 733 went to Canada. The second largest purchaser was Australia, who received 199. Cuba came third with a total of 181. The commercial cars went chiefly to the United Kingdom, France and Canada.

Overland Prices Increased

DETROIT, July 10—The Willys-Overland, Toledo, has advanced the prices of all its models, effective July 16, as follows:

Model	Old Price	New Price
T, touring	$850	$895
roadster	850	895
90, country club	875	925
sedan	1340	1385
panel delivery	865	895
express delivery	840	875
85-4 touring	965	1025
roadster	965	1025
1200-lb. delivery	975	1075
85-6 touring	1195	1300
roadster	1195	1300
85-6 coupe	1420	1550
sedan	1620	1720
89 touring	1450	1525
club roadster	1450	1525
88-4 touring	1625	1650
coupe*	2275	2600
sedan*	2325	2650
limousine*	2425	2750
88-8 touring†	2100	2500
limousine†	2900	3300
coupe†	2770	3175
sedan†	2800	3200

*Include 5-inch cord tires.
†Include 5 wire wheels and 5-inch cord tires.

Rainier Adds 1½-Ton Model

NEW YORK, July 10—The Rainier Motor Corp. will begin shipments of a new 1½-ton truck styled R-6 in the latter part of July. The chassis price has been fixed at $1,790 f.o.b. the factory in Flushing. This model will have a Continental 3½ x 5⅛ in. engine, with governor, Brown-Lipe clutch and transmission and worm-driven rear axle. The wheelbase is 133 in. and the tire equipment is the Firestone solid pressed-on type, 34 x 4.

Big Spurt in Rubber Imports

Nearly 8000 More Came in During June Than May—Figures for Half Year

NEW YORK, July 10—Imports of crude rubber took a big spurt during the month of June, an increase of 7836 tons being shown over the quantity which came in during May. During the first six months of 1918 the total amount imported was 99,468 tons. This is 11,387 tons more than were imported during the first six months of 1917.

The big increase shown during the month of June probably is due to a certain extent to anticipation of the action of the War Trade Board in limiting imports. The quantity which is to be allowed to come in during the period from May 6 to July 31 has been set as 25,000 tons, which will make an aggregate total of 100,000 tons for the entire year. Although this total has now been reached, most of the rubber which has come in has been what is known as free rubber, which is to say that it was shipped prior to May 8, when the restrictions on imports became effective. Following are the statistics compiled by the Rubber Association of America:

Month	1917, tons	1918, tons
January	12,788	16,084
February	10,162	13,108
March	18,624	17,161
April	13,000	12,703
May	18,411	16,288
June	15,096	24,124
Total	88,081	99,468

Exports of Automotive Equipment for May and Eleven Previous Months

	Month of May 1918 No.	1918 Value	1917 No.	1917 Value	Eleven Months Ending May, 1918 1918 No.	1918 Value	1917 No.	1917 Value
Airplanes	1	$10,000	24	$175,111	19	$202,620	57	$550,647
Airplane parts	.....	771,678	.....	513,104	.....	6,836,574	.....	2,632,430
Commercial cars	866	1,958,603	1,764	3,222,807	11,370	29,844,340	14,732	39,378,248
Motorcycles	729	154,555	1,074	224,533	9,576	2,087,235	14,916	3,047,099
Passenger cars	2,801	2,907,390	6,726	5,490,509	49,210	42,518,208	57,226	42,899,955
Parts, not including engines and tires	.....	2,859,496	.....	2,715,775	.....	29,737,653	.....	24,518,051
Total	.....	$8,661,722	.....	$12,341,839	.....	$111,226,630	.....	$113,026,430
ENGINES								
Automobile gas	2,210	$208,371	2,389	$229,678	33,472	3,880,248	21,467	2,581,754
Marine gas	580	342,407	1,079	192,840	6,983	2,457,137	8,359	1,946,615
Stationary gas	3,126	413,481	2,421	259,205	25,634	2,915,127	28,685	2,856,912
Tractor and creeper type gas	2,832	2,741,772	1,424	1,766,741	22,118	22,136,729	6,813	8,821,632
Total Engines	8,748	$3,706,031	7,313	$2,448,464	88,207	$31,389,241	65,324	$16,216,913

EXPORTS BY COUNTRIES MAY, 1918

	Passenger Cars		Trucks		Passenger Cars		Trucks	
Argentina	120	$120,721	.....	.....	3,292	$2,391,687	.....	.....
Australia	199	182,980	.....	.....	4,003	3,150,282	.....	.....
British India	2	2,576	.....	.....	59	39,978	.....	.....
British South Africa	70	68,250	.....	.....	1,918	1,522,482	.....	.....
Canada	733	652,209	146	$140,532	12,503	9,750,648	1,001	$1,247,405
Chile	107	173,683	.....	.....	3,100	3,214,457	.....	.....
Cuba	181	203,220	.....	.....	2,784	2,819,171	.....	.....
Denmark	.....	.....	.....	.....	2	4,100	.....	.....
Dutch East Indies	1	442	.....	.....	1,272	1,302,800	.....	.....
France	108	365,375	118	383,831	984	1,402,527	2,493	9,055,900
New Zealand	58	45,477	.....	.....	1,682	1,342,720	.....	.....
Norway	2	2,800	.....	.....	92	97,366	.....	.....
Philippine Islands	171	164,786	.....	.....	1,659	1,339,272	.....	.....
Russia in Europe	.....	.....	.....	.....	492	1,136,400	.....	.....
Russia in Asia	.....	.....	.....	.....	5	8,425	406	1,562,303
United Kingdom	6	10,754	299	948,436	892	1,929,677	5,047	14,185,552
Other Countries	.....	.....	303	485,804	.....	.....	2,423	3,793,180
Totals	2,801	$2,907,390	866	$1,958,603	49,210	$42,518,208	11,370	$29,844,340

Rules for Recruiting Unskilled Labor

Only Those Employing Over 100 Need Go to Government Employment Bureau

WASHINGTON, July 8 — Amending the original labor program, the Department of Labor states that for the present only manufacturers engaged on war contracts and employing over 100 workers will be required to recruit unskilled labor through the United States Employment Service after Aug. 1. Non-war industries will be affected only indirectly in so far as they must not offer superior inducements, prevent the transfer of workers urgently needed for war production or in any way attempt to compete with the Government for labor.

The following five classes of labor need not for the present be recruited through the U. S. Employment Service, although of course the machinery of the Employment Service is available to all employers seeking these classes:

1.—Labor which is not directly or indirectly solicited.

2.—Labor for railroads, except in so far as the Director-General of Railroads has or may recruit, that recruiting shall be exclusively through the United States Employment Service.

3.—Farm labor, which will be recruited through the Department of Agriculture.

4.—Labor for non-war work.

5.—Labor for establishments in which the maximum force including the additional number recruited does not exceed 100 employees.

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WASHINGTON, June 28—The number of workers in automobile factories decreased 10.5 per cent in the past year, according to a report by the Department of Labor. In March, 1917, 27 automobile manufacturing plants reported 83,678 workers, and in March, 1918, 74,889. Forty-nine factories reported 118,255 workers in February, 1918, and 122,998 workers in March, 1918, an increase of 4 per cent, while in the same time the salaries for February, $2,642,162, were 11 per cent less than those in March, $2,933,676, showing a startling increase in wages as compared with the increase in the number of workers.

Below is a table making comparison of employment in identical establishments in February, 1918, and March, 1918, showing increase and decrease of employment and wages.

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Reclassify Automobile Mechanics

BOSTON, July 8—The draft boards in Boston have set about reclassifying workers in the automobile industry, and during the past week a number of employees were ordered to come in and report what their work amounted to. Those who were doing nothing but the ordinary cleaning of cars or trucks, or porter work, were told that it did not grant them any exemption, and so some of them have been changed from the deferred class into Class 1A. Others who were working as mechanics were questioned as to whether they were employed upon trucks or passenger cars, and it is thought that the boards will rule that if they are repairmen on the passenger cars they will be certified into the "work or fight" class. Salesmen were not all called in, for about all those left now in the industry are above the draft age.

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Local Labor Boards

WASHINGTON, July 8—Community labor boards to supervise recruiting and distribution of labor will be established in each industrial region of the country by the United States Employment Service. They will apply the federal labor policies as the local draft boards put into operation the selective construction act. Employees and employers will select representatives for these boards to insure adequate representation. There will be one representative of employers, one representative of employees, and three representatives of the United States Employment Service. The members of the boards will be appointed by the State directors of the U. S. Public Service Reserve assisted by Chambers of Commerce and manufacturers' associations, who will nominate industrial management representatives, and State and city federations of labor, which will nominate the labor members.

Comparative Figures of Employees in Identical Trades in February and March, 1918

Industry	Establishments Reporting for February and March	Period of Payroll	Number on Payroll in—		Per Cent of Increase (+) or Decrease (−)	Amount of Payroll in—		Per Cent of Increase (+) or Decrease (−)
			February, 1918	March, 1918		February, 1918	March, 1918	
Boots and shoes	71	1 week	60,767	60,980	+0.4	$933,308	$1,016,947	+ 9.0
Cotton manufacturing	55	1 week	51,981	54,394	+4.6	639,660	740,215	+15.7
Cotton finishing	18	1 week	14,721	15,084	+2.5	222,404	244,357	+ 9.9
Hosiery and underwear	57	1 week	29,105	29,495	+1.3	324,424	382,099	+17.8
Woolen	50	1 week	48,578	50,653	+4.3	689,834	852,858	+23.6
Silk	39	2 weeks	13,572	13,685	+ .8	304,072	348,561	+14.6
Men's ready-made clothing	35	1 week	25,534	24,581	−3.7	432,465	442,757	+ 2.4
Iron and steel	107	½ month	204,972	208,544	+1.7	10,123,423	11,007,962	+ 8.7
Car building and repairing	30	½ month	29,966	29,778	− .6	1,160,831	1,263,235	+ 8.8
Cigar manufacturing	56	1 week	18,996	19,557	+3.0	245,837	265,174	+ 7.9
Automobile manufacturing	49	1 week	118,255	122,998	+4.0	2,642,126	2,933,676	+11.0
Leather manufacturing	36	1 week	16,199	15,790	−2.5	262,720	281,826	+ 7.3
Paper making	49	1 week	25,715	26,625	+3.5	430,921	494,910	+14.8

War Industry Short 300,000 Workers

U. S. Employment Service Seeking Relief—Coal Miners Needed

WASHINGTON, July 8—War industries of the United States are to-day short between 300,000 and 400,000 unskilled workers. The shortage of workers in the coal mining industries is said by the Department of Labor to be imperiling all other war production.

The situation is considered so serious that the United States Employment Service, which assumes control of unskilled labor on Aug. 1, is endeavoring to complete its machinery so that relief may be given even before that date.

Skilled labor is also facing a serious shortage. One of the largest munitions plants, turning out heavy-caliber guns, is short 2000 machinists. The war plants of Connecticut and Maryland alone face a shortage of 35,000 skilled machinists. The solution, according to the Department of Labor, lies in the recruiting by the United States Employment Service of workers for war work from the non-war industries as quickly as possible.

This work, as was told previously, is to be undertaken at the earliest possible moment by the United States Employment Service, which is increasing its offices to number 700 throughout the country, and is adding greatly to corps of local agents and traveling examiners.

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Many Jobs for Women Workers

WASHINGTON, July 5—Women are packing parts, stuffing bags with excelsior, working on wire parts, cutting copper pieces, binding wires with tape, and soldering joints of wire, applying "dope" and painting the United States Emblem on the bodies of the airplanes in airplane factories, according to a report made by the Women's Committee, Council of National Defense. They are also doing light carpentering and metal work, and sew linen on the wings.

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Mammoth Hotel Garage for New York

NEW YORK, July 8—Hotel men representing a number of the largest hostelries in the city, such, for example, as the Waldorf-Astoria, McAlpin, Claridge, Plaza, Ritz-Carlton, etc., are interested in the erection of a mammoth garage to care for the cars of hotel guests. A company has been incorporated under the style Inter-State Garages, Inc., and it is planned eventually to have a garage in all of the principal cities in the country. The company has obtained a city block bounded by 47th and 48th streets on Second avenue, with a frontage of 250 ft., and extending 350 ft. on the side streets. It is planned to provide an individual locked space for each car, the total capacity to be 863 cars. There will be no elevators, ramps being used to reach the five floors of the building.

South Africa Is Poor Tractor Field

Gasoline $1 a Gallon — Machinery Won't Displace Oxen For Some Time

CAPE TOWN, SOUTH AFRICA, May 10.—Any attempt to sell gasoline farm tractors in South Africa to-day will meet with heavy resistance because the price of gasoline is $1 per gallon, which makes it prohibitive for farm cultivation. Kerosene is selling at half this price, but if the wear and tear on an engine burning kerosene is greater than that using gasoline, and the same efficiency is not obtained from kerosene, it is a problem to see how it will be economical to use kerosene.

That a tractor is pretty expensive to operate here in addition to the fuel cost is evident because of the great use of oxen for agricultural purposes. The farms are so large in area that it costs very little to feed the oxen, so that farm cultivation with them is cheap no matter how much they are used. Many farmers consider oxen a good investment, even if they are only worked a few days of the year and the remainder of the time are kept grazing.

While the South African farmer will continue to use oxen for many years to come there is certain to be an opening for a suitable farm tractor at the conclusion of hostilities in Europe. There are several South African distributers who are giving personal investigation to the tractor situation, and while they do not expect actively to take up sales for some time they feel certain that the day of the tractor in South Africa is sure to follow the closing of the war. Large farmers are certain to take on a few for experimental purposes, and these will form the beginning of the tractor business.

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Fordson Reports Misleading

LONDON, ENGLAND, June 20—The circulation of derogatory reports with regard to the performance of Fordson tractors is heard from time to time, and it is unfortunate that these continue to receive attention in many places.

Persons circulating such reports must be ignorant of the exhaustive tests to which these tractors were submitted before the British government permitted itself to purchase 6000 of them. They must also be ignorant of the success this tractor achieved in the competitions arranged by the Food Production Department. They apparently are not aware that these tractors worked 24 hours a day in actual plowing before the government decided to purchase them.

The best answer to the suggestion that the Fordson is not successful when using kerosene for fuel is the fact that these tests were accomplished on kerosene, and the British government after exhaustive trials has continued to use kerosene as the fuel in all of the Fordson tractors. Six acres were plowed in 44½ hours with a consumption of 1.84 gal. of kerosene per acre. This was made under official observation. The gallon referred to is the British Imperial gallon, which is one-fifth larger than the American gallon.

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England Unifying Transportation

LONDON, ENGLAND, June 4.—England is wrestling with the problem of unifying as well as effecting national control of all forms of transportation. At a recent meeting of the Transport Workers' Federation it was proposed that a National Board of Communications be formed, the constitution of which would be equal representation of employees and the state. This board will take over and administer all inland passenger, mail and merchandise transportation. It would embrace transportation by highway, railroad, water and air.

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World-Wide American Trade Organization

LONDON, July 6—A world-wide organization of bodies interested in American foreign trade may result from steps recently taken by the American Chamber of Commerce in London. On the ground that nothing short of intelligent co-operation can prevent waste of effort in the end, this chamber has invited about twenty of the leading American foreign trade organizations both in the United States and abroad to work out a practical plan for close co-operation.

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Permits for Use of Roads

LONDON, ENGLAND, June 19.—After Sept. 1 no person in England will be permitted to use a vehicle for the transportation of merchandise on the highways except in accordance with the terms of a permit granted by the Road Transport Board. This is one of the first tangible steps in the complete co-ordination of the vehicles on the highway system.

The official order known as Road Transport Order 1918, issued June 4, specifies that all persons owning or having under their control any vehicle used for the transportation of merchandise by highway shall, before July 31, make a return on the prescribed blank, giving details of the vehicles, their load capacities, and the work for which they are normally used. The only exception to this order is agricultural vehicles and horse-drawn vehicles having a load capacity of less than 1680 lb.

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To Secure Widespread Interest in Export Trade

LONDON, July 6—To secure a greater personal interest among prominent American business men in every city for American export trade, the American Chamber of Commerce in London is asking secretaries of Chambers of Commerce throughout the United States to give it the names of members interested either in export trade or in our general relations with Great Britain.

Lack of Ships Hurts South America

Merchants Can't Move Goods Out and Cars Can't Come In —Expect Improvement

BUENOS AIRES, ARGENTINA, May 20.—Shipping conditions are the greatest problem that the Argentine distributers have to cope with to-day. There is the difficulty of the Argentine merchant getting ships to move his products, and added to this the export tax that the government levies on all goods exported. Notwithstanding this situation, the good crops of the past season have done much to overbalance the bad conditions following the railroad strikes which began last November. Business conditions are not what they should be, which is partly due to the export situation, and also to the restricted imports. Many stocks of goods are being rapidly absorbed, and prices are increasing every day.

The automobile distributers in Argentina are coping as well as they can with these generally unfavorable conditions, and are looking forward to increased shipments of automobiles, trucks and accessories from America. It is hoped that good shipments will be forthcoming in October so that the coming summer selling season will be favorable.

The numerous strikes have not been without their favorable side, and during the past 10 months, which has been the period of strikes, the automobile distributer has had the opportunity of demonstrating to the Argentine public that the automobile is a practical and essential vehicle. Some of the more enterprising distributors sent cars all over the country and were able to get a great deal of propaganda out of this. Studebaker was one of the leaders in this movement.

Gasoline is now selling at 90 cents a gallon, which, taken in conjunction with the high price of tires, has materially increased the cost of operating a car. The scarcity of gasoline has had a depressing effect, but there are assurances that the United States will supply all that is necessary. Lower powered cars and those economical in fuel are bound to have greater selling opportunities than those which are heavy consumers of gasoline and are heavy users of tires. Shipments of gasoline reaching Argentina before October, or even during November and December, will have a very beneficial effect on the sale of automobiles during the coming spring and summer.

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Hardcastle and Rochette Partners

BUENOS AIRES, ARGENTINA, June 1.—P. A. Hardcastle, Overland distributer for Argentina, has formed a partnership with E. Rochette, who was formerly in charge of the Overland business for all South America. For over 2 years Rochette has been making his headquarters in Buenos Aires. Hardcastle will continue actively in the business.

15 Tractor Makers on Exhibition List

Implement Manufacturers Also Reserve Space for Salina Farming Demonstration

NEW YORK, July 5—Fifteen manufacturers of farm tractors and four makers of plows and other implements have reserved space for the National Tractor Farming Demonstration which is to be held at Salina, Kan., July 29 to Aug. 2. It is expected that the list will be lengthened from week to week, and that the accessory exhibition will be even more comprehensive than has been the case in the past. Following is the complete list of exhibitors to date:

Tractors

Avery Co.	Peoria
Square Turn Tractor Co.	Chicago
Hart Parr Co.	Charles City
Holt Mfg. Co.	Peoria
Nilson Tractor Co.	Minneapolis
Moline Plow Co.	Moline
Dauch Mfg. Co.	Sandusky
Parrett Tractor Co.	Chicago
Russell Co.	Massillon
Gile Tractor & Engine Co.	Ludington
Advance Rumely Thresher Co.	La Porte
Aultman & Taylor Machine Co.	Mansfield
Rock Island Plow Co.	Rock Island
Gray Tractor Co.	Minneapolis
La Crosse Tractor Co.	La Crosse

Implements

P. & O. Plow Co.	Canton
Oliver Chilled Plow Works	So. Bend
John Deere Plow Co.	Moline
Grand DeTour Plow Co.	Dixon

Following are the complete rules and regulations for the National Tractor Farming Demonstration:

1. Public demonstrations shall begin at 1 o'clock and end at 3, unless other hours are announced by local committee at least 24 hours before starting time. Private demonstrations may be held in the forenoon from 8 o'clock to 11.30.

2. No exhibitor shall be allowed more than one tractor of each size and type on the field during the public demonstrations doing the same kind of work. He may have one or more machines performing different operations, namely, one plowing, one disking, one seeding, etc.

3. Size of land for each tractor exhibitor for plowing demonstrations will be determined by the average number of plow bottoms pulled, the width of plows and speed of machine as given in company's catalog. Each tractor exhibitor must plow out dead furrow to its left.

4. All plows on any given gang must be set at the same depth and kept there during the day's demonstration. This depth will be announced daily by the general manager. (Plows found operating otherwise will be ordered from the field for the balance of the day's work.)

5. All exhibitors will be allotted land in the same field or adjoining fields during each day's demonstration. Land for private demonstrations will be provided daily, in one field or adjoining fields.

6. In all public demonstrations the motor or tractor must not be run at more than 10 per cent above its catalog plowing speed. Tractors may be run on high gear with normal engine speed when disking, harrowing, seeding, etc.

7. Positions on field first day will be arranged by lot, in following manner:

Drawing to take place at 10 A. M. Monday, the opening day of demonstration, by serial numbers representing total number of exhibitors.

Position on field for the first public demonstration will be according to numbers, starting 1, 2, 3, 4, etc.

The total number of exhibitors will be divided into same number of divisions A, B, etc. "A" will occupy preferred position on first day public demonstration, and "B" preferred position on second day, etc.

Exhibitors who do not have representatives at drawing, the drawing will be done for him under the direction of the general manager.

Each exhibitor will be required to finish his land daily in a workmanlike manner, and assist in plowing the end lands as directed by the general manager.

8. Each field plowed will be surveyed and staked ready for afternoon demonstrations. These fields will be tested for the drawbar pull of a 14-inch plow, plowing at the specified depth previous to the demonstration. All manufacturers will be furnished information relative to drawbar pull so they can better determine the number of plows to use on each gang.

9. Each tractor shall bear a placard, to be furnished by the chief observer, showing the brake horsepower of the engine, the revolutions per minute, the plowing speed in miles per hour, and the kind of fuel used and its Baume test. Tractors using more than five per cent of gasoline shall be classed as burning gasoline and be so placarded.

10. All tractors on the demonstration field belonging to one exhibitor must be kept on or along the land allotted him for that day's demonstration, until the hour designated by management for returning to headquarters.

11. No machine will be allowed to operate with special equipment other than that designed for practcial use with same. No spectacular methods will be permitted on the part of salesmen or others to attract crowds. The demonstration must speak for itself.

12. Each tractor exhibitor will have the privilege of burning any kind of fuel he desires, but no one will be permitted to burn fuel of higher gravity test than that used by his competitor burning the same kind of fuel. All exhibitors will be required to obtain fuel from one source, such to be designated by general manager.

13. No time will be required of exhibitors to make movie pictures or group photographs for commercial purposes. Manufacturers can arrange to get photographs during the demonstration if they desire. Any manufacturer or representative of farm or trade papers, or news agency will be allowed to have their official photographer on the grounds to get pictures for their own use.

14. Manufacturers will be privileged to make brake horsepower, drawbar pull, and such other efficiency tests as they desire. All such tests desired should be reported to the general manager not later than July 15, so that a sufficient number of Prony brakes, dynamometers and other apparatus can be provided. These early announcements will also be necessary in order that a suitable number of competent judges and sufficient acreage can be provided for all who desire to make tests.

15. The results of all tests made at the demonstration shall be furnished to the exhibitors only and such exhibitors may publish the results as official from the management of the demonstration. No official report of any tests made will be kept by the general manager, judges or the association except by permission of the exhibitor making the tests.

16. Manufacturers will be privileged to exhibit not more than two belt-driven machines in connection with their exhibition.

17. Arrangements will be made for daily demonstrations showing use of tractors harrowing, disking, seeding, and other farm operations, demonstrating general utility of the tractor. The rules governing these demonstrations will be the same as those applied to plowing.

18. The interpretation and enforcing of these rules shall be left to the local manager of each demonstration and the general manager of the demonstrations.

19. Each company exhibiting at these demonstrations shall appoint one manager, who will be expected to report to the general manager not later than 8 o'clock each morning for instructions and information regarding the day's work. This manager of exhibits will be held accountable for the work of his company and no instructions will be issued to any one else, nor will requests, instructions, or complaints be recognized from any one but this exhibit manager. He shall wear a badge furnished him, specifying his being official exhibit manager.

20. Each exhibitor will be expected to keep plows, tractors, etc., around his tent arranged in first class order, and the land allotted him for exhibiting purposes free from circulars, rubbish, etc., such as will be distributed around headquarters daily. They will also be expected to use care at all times in operating machinery with respect to its safety for all visitors. The management will appreciate co-operation of these exhibit managers in all matters.

21. Each entrant will sign the rules and thereby agree to live up to the rules and cooperate with the committee in every way to make the tractor demonstration a success.

22. The field manager shall have authority to order from the field any machine whose operator does not comply with the rules, and, further, any exhibitor who is manifestly disregarding the rules will not have land laid out or furnished for him on the succeeding days, or until such time as he has met the conditions.

23. No exhibitor joining the national demonstration will be permitted to exhibit until he has given correctly the price that he is in position to furnish tractors at regular production, the correct weight of tractors, and all data pertaining to their construction and rating, minimum and maximum speed at which the motors are to run, and the committee has the right to have any such machines placed under test to prove the correctness of the data that are furnished.

Store Door Delivery for New York

James S. Harlan of Interstate Commerce Commission Outlines Plan for Shipments

NEW YORK CITY, July 8—The greatest step yet taken to eliminate the serious l. c. l. railway freight terminal congestion in New York City was made here to-day by James S. Harlan, Interstate Commerce Commissioner, who outlined a plan for the delivery of all l. c. l. freight direct from the terminals to the consignees without the formality of any notices of arrival. At first the plan contemplated handling only the incoming shipments and these will be delivered to the consignees on their dates of arrival and stored in public warehouses if the consignees refuse to accept them and pay the freight and delivery charges when they are delivered at their doors.

The entire mercantile district of the city will be divided off into zones and all the trucks delivering the freight will leave from the various terminals with full loads to be delivered in one of the zones. Each truck used in the work will be registered and will be under the supervision of a city drayage director who will have general supervision and control for the consignee of the trucking of freight from pier or freight station after it has been placed on the pier or freight station floor by the carrier.

Only registered trucks will be used to deliver the goods and full loads will be carried by each truck when it leaves the freight station or pier.

The system as proposed may be put into effect in this city by Aug. 15, 1918, and will prevent consignees from utilizing railroad cars, piers and freight stations as warehouses by taking advantage of the 48-hr. demurrage-free period heretofore in effect.

Although for the present, the system is to be only applied to incoming shipments, Commissioner Harlan believes that in the natural course of events, the many benefis will result in its being extended to include a pick-up service for outgoing goods. The whole system is to be largely self-governed and there probably will be a carriers' committee, a shippers' committee and a draymen's committee for the purpose.

Gasoline Production Increases

Record Output in April—Ten Months Figures for Production and Stock on Hand

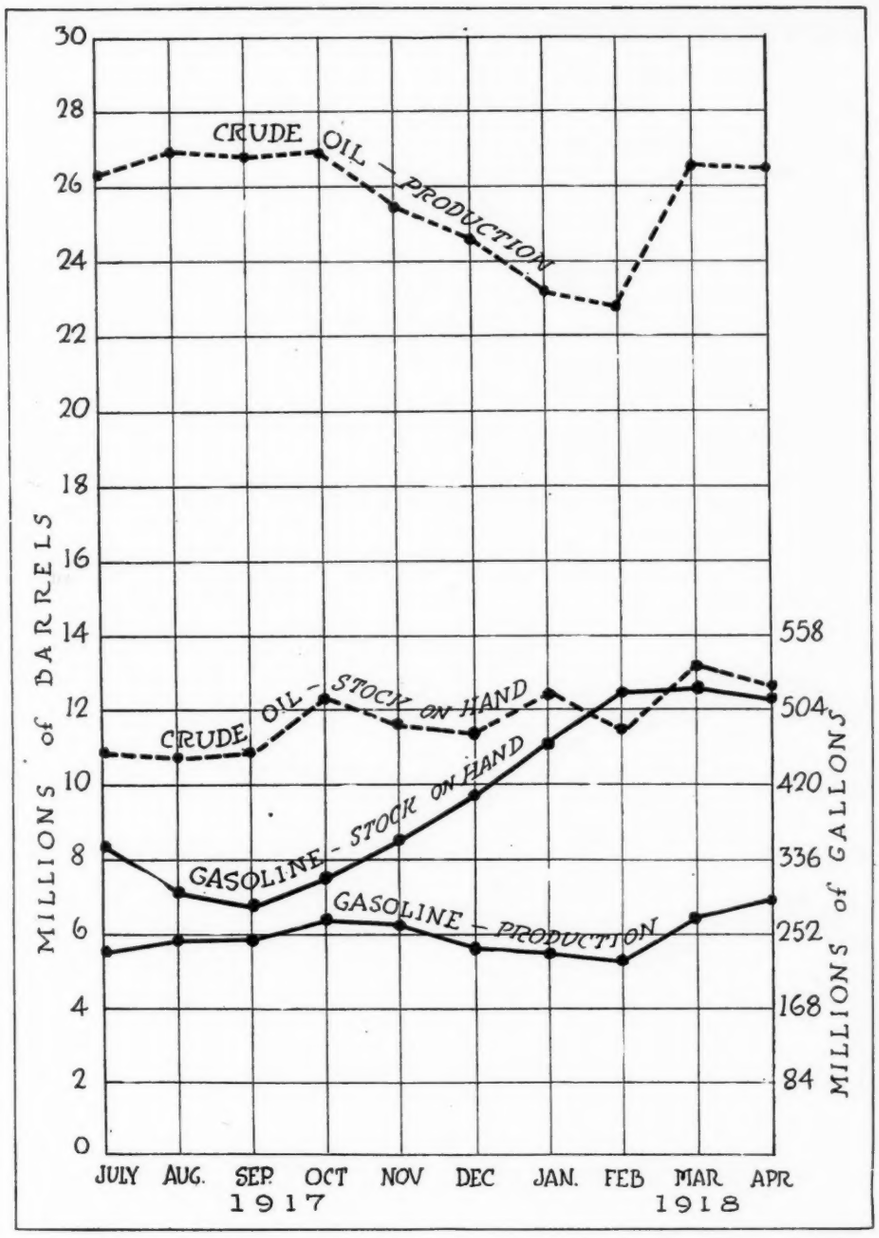
WASHINGTON, July 8—The production of gasoline in April of this year was the largest that the country has ever known. It was more than 23,000,000 gal. greater than the production in March and more than 80,000,000 greater than the output of April, 1917. The daily average production for April, 1918, was 9,779,872 gal.

According to figures just issued by the Bureau of Mines, the stock of gasoline on hand at the refineries on April 30, 1918, was 509,197,134 gal., or 17,185,252 gal. less than was on hand one month previous, but it was 163,997,939 gal. greater than the stock on hand on July 30, 1917.

Crude oil production in April showed a very slight drop which, in view of the fluctuations in the production curve, is almost negligible. The decrease amounted to only 38,108 bbl. when compared with the output for March. The 26,201,554 bbl. of crude produced in April constitutes an output greater by about 4,000,000 bbl. than that of February. The stock of crude on hand April 30 was greater than that on hand at any other recent time except March 31, 1918.

The curves accompanying show how the production and stocks on hand of crude oil and gasoline have varied since July, 1917. The following table gives the amount of crude and distillates on hand at refineries on April 30 and March 31:

1918	Total April 30, 1918	Total March 31, 1918
Crude run (bbl.)	12,600,062	26,239,662
Oils purchased to be re-run (bbl)	954,205	3,696,872
Gasoline (gal.)	509,197,134	269,627,968
Kerosene (gal.)	393,527,476	151,228,007
Gas and Fuel(gal.)	471,644,479	587,985,804
Lube (gal.)	144,383,212	69,308,351
Wax (lb.)	151,228,317	43,957,019
Coke (ton)	13,109	44,248
Asphalt (ton)	101,328	56,901
Misc. (gal.)	248,260,551	94,865,148



Production and stocks on hand of crude oil and gasoline for the past ten months

Plenty of Gasoline If Not Wasted

WASHINGTON, July 9—There is no shortage of gasoline. The gasoline supplies are ample to take care of our war and normal requirements if we will practise sane conservation in this country.

These statements were made to-day by W. Champlin Robinson, Director of Oil Conservation, United States Fuel Administration. The demand for gasoline for airplanes and trucks with the American Expeditionary Forces is constantly growing, and will necessitate continually increasing shipments overseas.

The present stocks are now ample to supply the war needs and allow the normal rational consumption to continue. But waste of gasoline must cease, stated Mr. Robinson, in order that we may be able to continue normal rational consumption in this country and amply meet our war requirements.

There is no suggestion of enforced curtailment of gasoline or lubricating oils in the minds of the Fuel Administration.

There is no suggestion of limiting the use of passenger cars, despite newspaper reports to the contrary.

There is a decided opposition by the Fuel Administration, however, to the careless wasteful handling of gasoline as exists at present in this country, and the Fuel Administration warns that unless the waste is eliminated possible restrictions may have to be inaugurated to insure sufficient gasoline and oil for our war needs.

The Fuel Administration will soon issue a poster to every garage and distributer of oil and gasoline, pointing out five important methods of preventing waste, as follows:

1—That the use of gasoline for cleaning parts be abolished.

2—That all leaks in gasoline lines on passenger cars, gasoline tanks, gasoline tank hoses and nozzles, etc., be stopped.

3—That careless handling of the gasoline tanks and hoses creating unnecessary waste through spilling be stopped.

4—That the tops of gasoline tanks be kept tight.

5—That motorists shut off their engines when not driving.

Plenty of Gasoline if Not Wasted

PLAINFIELD, N. J., July 8—The Wright-Martin Aircraft Corp., Long Island City, has purchased the Plainfield (N. J.) plant of the Bosch Magneto Co. The plant has not been used for some little time. It is not stated for what purpose Wright-Martin will use it.

Happy Farmer Equipment To Be a One-Man Outfit

LA SALLE, WIS., July 6—A line of farm machinery specially designed for use with the Happy Farmer tractor so that one man can operate the tractor as well as the machinery is being developed. The line will consist of gang plow, disk harrow and power-lift seed drill. The control levers on these pieces of machinery will be such that they can be operated by the tractor driver, thus making the machinery a one-man outfit. The LaCrosse Tractor Co. is working on a production schedule of 4000 tractors this year.

—

Overland Factory Being Enlarged

TOLEDO, July 5—The Willys-Overland Co. is building additions costing $307,430 to its Toledo plant. The largest addition is to be a 300-ft., one-story structure, costing $225,000, to be fitted as a machine shop for making 8-in. shells, under a new contract recently awarded the company. Other additions are a boiler room, costing $65,430, and an extension to one of the factory offices at a cost of $15,000. All have been necessitated by the large demands upon the company by the government.

—

Perfex Radiator to Expand

RACINE, WIS., July 8—The Perfex Radiator Co., Racine, Wis., expects to begin work Aug. 1 on its new plant, to be 125 x 300, three stories, and cost more than $100,000.

—

New Shop for Federal

MILWAUKEE, July 8—The Federal Pressed Steel Co., which is devoting much capacity to the manufacture of shells for anti-aircraft guns and other munitions, will build a new machine shop, 100 x 252, at its works on Keefe Avenue, at North Pierce Street, Milwaukee. The project will involve a total expenditure of more than $125,000 in buildings and equipment.

—

Geuder, Paeschke & Frey Adds

MILWAUKEE, July 8—The Geuder, Paeschke & Frey Co. has broken ground for a new galvanizing and pickling shop, 50 x 45, at its main works at Fourteenth Street and St. Paul Avenue. The unit will cost about $15,000 completely equipped.

—

Coast Branch for Hyatt

NEW YORK, July 8—The Hyatt Roller Bearing Co. of Chicago has opened a branch office in San Francisco, from which Pacific Coast trade will be handled. A. W. Fisher will be in charge of the branch.

—

Gerlinger to Double Capacity

MILWAUKEE, July 8—The Gerlinger Steel Casting Co. has started work on the construction of additions which will increase the capacity more than 100 per cent. The company has been operating an electric steel foundry exclusively for several years, but has been engaged in the steel foundry business for many years. The main addition will be 80 x 171 x 200, and will be equipped with a new 5-ton Moore electric furnace. The present equipment consists of one ¾-ton and one 1½-ton Snyder electric furnaces.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

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Austin Developing Farm Tractor

CHICAGO, July 6—The F. C. Austin Corp. has for some time been developing a farm tractor which it expects to start production on this fall, and to build in quantities. This company has for years been a large manufacturer of road machinery, the manufacture of which is continuing, but a new factory is being built for tractor production. Technical details are not available, but it is expected the tractor will sell somewhere between $1,600 and $2,000.

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O'Neil Paint Expands

MILWAUKEE, July 8—The O'Neil Oil & Paint Co., 297 East Water Street, Milwaukee, a large refiner and wholesaler of motor oils, gasoline, etc., has increased its capital stock from $350,000 to $500,000 to accommodate the growth of its business. At the annual meeting several employees were elected vice-presidents in appreciation of faithful service. Harry C. Topp, assistant treasurer and credit manager, was elected treasurer to succeed William E. Krause, who resigned July 1. The official personnel now is: President, George F. O'Neil; vice-presidents, L. D. O'Neil, James S. Motter, Frederick C. Fowler and Roy H. O'Neil; secretary, H. W. Houghton; treasurer, Harry C. Topp; assistant treasurer, P. M. Lauf.

—

Stroh Castings Enlarges Plant

DETROIT, July 6—The Stroh Castings Co. announces the conclusion of plans to add a second plant. The old Denby Motor Truck Co. factory at 22 Dubois Street has been taken over. This has 25,000 sq. ft. of floor space, and will be devoted exclusively to cleaning, grinding, inspection and shipping. The space formerly occupied by these departments will be used for moulding, and the plant will have a capacity of 100 tons of castings daily, 90 per cent of which will be taken by the Government.

—

Wilcox Making Army Tents

TOLEDO, July 5—The M. I. Wilcox Co., manufacturer of radiator covers, is working on a government order for tents at the new plant, No. 3, which is a three-story building with basement, and contains 20,000 sq. ft. of floor space.

United States Carbureter Breaks Ground for Plant

OMAHA, July 6—Ground has been broken for the first unit of the factory buildings to be occupied by the United States Carbureter Co. The company, which is capitalized at $500,000, is manufacturing a kerosene carbureter, 15,000 of which already have been contracted for, and the output of the factory, about 500 a day, has been sold for some time ahead. The factory will be located on the belt line facing Florence Boulevard. The first structure will be 125 x 125, and will house 200 men. The officers of the company are: President, Henry R. Gering; vice-president, A. C. Marshall; secretary, T. R. Murphy; treasurer, Henry T. Goos.

—

Automotive Sales Co. Incorporates

DETROIT, July 6—The Automotive Sales Co. has been incorporated and will conduct an automotive manufacturers' sales agency, with offices at 554 Book Building. W. L. Mack, formerly sales manager of the Shakespeare Co., Kalamazoo, Mich., is president. A. H. Doolittle, for the last 3 years sales manager for the Zenith Carburetor Co., Detroit, is treasurer and manager. The company will sell entire factory outputs and handle all factory sales of the Shakespeare company, Copeman Lubricating System and Connecticut Electric Clock, as well as several other automotive specialties.

—

Lapeer Tractor-Truck Plant Complete

LAPEER, MICH., July 6—The new plant of the Lapeer Tractor-Truck Co. was completed last week. It is a two-story structure, 60 by 200 ft. Machinery is being delivered and the plant is expected to be completely equipped within the next 2 weeks. The capital stock of the company is $100,000, practically all of which has been subscribed for by Lapeer people. The officers of the company are: President, W. H. Tucker; vice-president, C. W. Smith; secretary, E. E. Mix; treasurer, R. T. Carpenter.

—

Schweppe & Wilt Enter Machine Tool Field

DETROIT, July 8—The Schweppe & Wilt Mfg. Co. has entered the machine tool field, and has taken over the business and part of the equipment of the Wilt Engineering Co. This latter concern was an engineering and developing company which brought out several new types of machine tools, which the Schweppe company will now manufacture, in addition to its standard automobile parts. The company has greatly increased its floor space.

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GRAND RAPIDS, July 8—The Rapid-Change Wheel Co. has been incorporated with a capitalization of $50,000. The company will make a supplemental hub. The officers are: President, John S. Noel; vice-president, J. Seman; secretary, Louis Dolan; treasurer, H. Hagen.

Couzens to Run for Mayor—Resigns as Head of Police

DETROIT, July 5—James Couzens, former vice-president and general manager of the Ford Motor Co., and for the past 2 years commissioner of police, has resigned the latter office to become a candidate for mayor.

—

George Woelfel, Jr., secretary to Commissioner William M. Webster, of the National Association of Automobile Accessory Jobbers, has resigned and will leave the work of the jobbers' association July 13.

—

N. W. Meyer, former sales promotion manager of the King Auto Sales Co., Detroit, has been appointed sales manager of the Detroit branch of the Roedding Signal Tail Light, Grand Rapids.

—

O. M. Brede, assistant secretary of the Detroit Section, Society of Automotive Engineers, has enlisted in the aviation section of the United States Army and has left for the aviation repair depot at Lovefield, Dallas, Texas. Mrs. Brede will fill the vacancy during the period of his enlistment.

—

T. L. Loose, formerly with the Hendee Mfg. Co., Springfield, Mass., is now manager of the Canton spring and axle plants of the Standard Parts Co., succeeding J. B. Childe, who will go to the general offices of the company in Cleveland.

—

W. L. Woodward, assistant manager of the rim and tube plant of the Standard Parts Co., became the manager of that factory July 1, succeeding J. C. Mantenach, whose resignation was effective that date.

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B. R. Winborn, until recently sales manager of the Perfection heater division of the Standard Parts Co., has been appointed general manager of that division.

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Corliss Wadleigh has been appointed manager of the New England branch of the Republic Tire Co., succeeding W. S. Carleton, who has entered the government service.

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Roy S. Fraser has been placed in charge of the New England branch of the Pennsylvania Tire & Rubber Co., taking the place of Wallace O. Durrell, who has joined the United States Army.

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Frank B. Crockett has resigned from the C. P. Rockwell Co., Boston, Mass., to take charge of the New England territory for the H. J. Koehler Co.

—

Prescott C. Ritchie has been appointed district representative of the Westinghouse Electric Mfg. Co., with headquarters in Indianapolis. He succeeds H. S. Johnson, who has resigned.

—

J. B. Clarkson, managing director of Hope Gibbons Sons & J. B. Clarkson, Wellington, New Zealand, dealer in automobile accessories, who is now in England, expects to sail from there in time to arrive in New York about July 10.

Men of the Industry

Changes in Personnel and Position

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Palmer to Manage Permalife

NEW YORK, July 8—C. B. Palmer has been elected general manager of the Permalife Storage Battery Co., Poughkeepsie, N. Y., and will have full charge of the business during the absence of President W. H. Lyall, who is in class 1A of the draft and expects soon to enter government service. Mr. Palmer was formerly secretary, treasurer and general manager of the Duchess Mfg. Co., Poughkeepsie, and for the past 2 years has been president of the board of directors.

—

Major B. H. Gitchel has been appointed chairman of the industrial relations section of the Aircraft Production Board, succeeding C. P. Neill. Major Gitchel is at present assistant in the office of the Secretary of War. Mr. Neill becomes chairman of the Railway Board of Adjustment No. 2.

—

G. Stanley Porter, who was connected with the Jackson Rim Co., Jackson, Mich., for the past 5 years, will have charge of the fabricated steel wheel department of the Hayes Wheel Co. of the same city.

—

L. K. Cooper has been appointed sales manager of the Chevrolet Motor Co. of St. Louis with headquarters at the St. Louis plant. He has been assistant to the sales manager of the Chevrolet Motor Co. of New York.

—

Charles Schenck, who has been with the Budd Wheel Corp., Philadelphia, for the past 2 years, has resigned as manager. His future plans have not been announced.

—

T. C. Woodin has been appointed sales manager of the Champion Spark Plug Co., Windsor, Ont.

—

F. W. Henderson has been elected president of the Signal Motor Truck Co., Detroit, to succeed A. C. Burch, resigned, to become vice-president of sales and a director of the Clyde Cars Corp., Clyde, Ohio.

—

C. C. Winningham has resigned as advertising manager of the Hudson Motor Car Co., Detroit, but retains his stock interests. He has not announced his future plans. It is said that no successor will be appointed during the war.

R. H. Johnston Elected Vice-President of White

NEW YORK, July 8—R. H. Johnston, who has been manager of the New York branch of the White company since 1910, and has been actively connected with the company for the past 15 years, has been elected a vice-president. He will immediately transfer his headquarters to Washington, and is to be succeeded as New York manager by William H. Moore of Pittsburgh.

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Deliver 5000 Class B Trucks

WASHINGTON, July 6—Slightly more than 5000 class B standard army trucks have been produced and delivered to the Government to date. Production of the B truck, which is 3-ton capacity, is between 75 and 100 per day. Production has been slightly hampered by some delays in parts manufacture.

—

Open Bids for Kitchen Trailers

WASHINGTON, July 8—Bids will be opened this week from automobile manufacturers for the 15,000 1½-ton kitchen trailers which will shortly be purchased. These trailers will be for delivery in September or October. Bids were requested in quantities of 500, 1000 and 2000, insuring wide distribution of the orders.

—

Refinery Plans Four Buildings

CLEVELAND, July 5—The newly organized Cleveland Smelting & Refining Co. has broken ground for the first of a cluster of units, which will be a storage building, 60 by 140 ft., to cost in the neighborhood of $20,000. Three other buildings, each 60 by 120 ft., will be erected later. These will be a refining room, blast furnace and copper room.

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New Incorporations

MILWAUKEE — Badger State Sales Co.; capital stock, $25,000; to deal in new and used motor vehicles; incorporators, Herbert F. Krueger, Milo E. Winkie and others.

MILWAUKEE—O'Neil Oil & Paint Co.; amendment to increase capital stock from $350,000 to $500,000.

MILWAUKEE—Crude Oil Gas Burner Co.; amendment to change corporate style to Crude Oil Gas Systems Co. J. L. Marshall, president; J. C. Pinney, Jr., secretary.

RACINE—Racine Mutual Automobile Insurance Co.; no capital stock; to underwrite motor vehicle coverage on mutual plan.

CHICAGO—The Perfection Truck Tire Co.; capital stock, $25,000; incorporators: F. H. Drury, W. A. Hamilton and W. L. Pollard.

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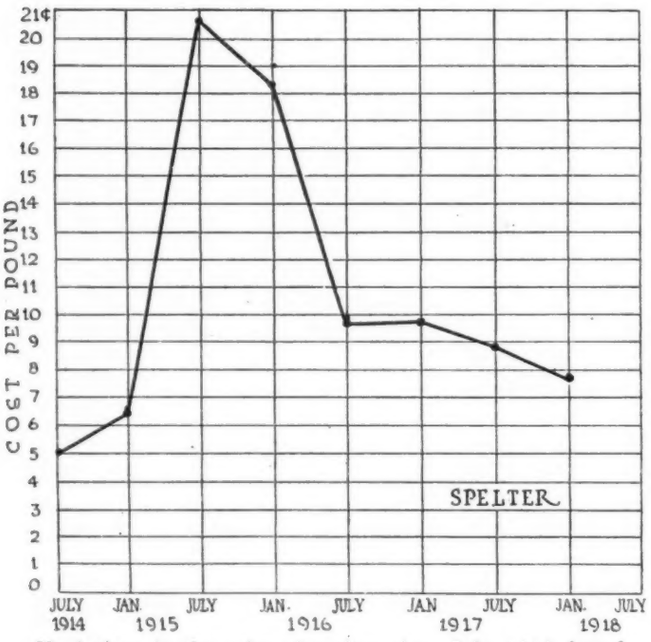
Dividends Declared

The Chevrolet Motor Co. declared its regular quarterly dividend of 3 per cent, payable Aug. 1 to stockholders of record July 15.

AUTOMOTIVE MATERIALS MARKETS

Material Market Prices

Acids:
Muriatic, lb. ..... .02-.03
Phosphoric, ct. .... .35-.39
Sulphuric (60), lb.. .11
Aluminum:
Ingot, lb. ..... .33
Sheets (18 gage or more), lb. ..... .40
Antimony, lb. ..... .13
Burlap:
8 oz. yd. ..... .19
10 oz., yd..... .23¼-.23½
Copper:
Elec., lb. ..... .26
Lake, lb. ..... .26
Fabric, Tire (17¼ oz.):
Sea Is., combed, lb. 1.65-1.70
Egypt, combed, lb.. 1.20-1.30
Egypt, carded, lb... 1.15-1.25
Peelers, combed, lb. 1.05-1.20
Peelers, carded, lb.. .95-1.05
Fibre (⅛ in. sheet base), lb. ..... .50



Variations in the price of spelter since July, 1914, based on the average daily quotations each month

Graphite:
Ceylon, lb. ..... .07½-.25
Madagascar, lb. ... .10 -.15
Mexican, lb. ..... .02⅔
Lead, lb. ..... .07¾-.08⅛
Leather:
Hides, lb. ..... .19-.33
Nickel, lb. ..... .40
Oil:
Gasoline:
Auto., gal. ..... .24
68 to 70 gal..... .30
Lard:
Prime City, gal..2.20
Ex. No. 1, gal...1.45-1.48
Linseed, gal. 1.65
Menhaden, gal. 1.05
Petroleum (crude):
Kansas, bbl.....2.25
Pennsylvania, bbl. 4.00
Rubber:
Ceylon:
First latex pale crepe, lb..... .63
Brown, crepe, thin, clear, lb..... .60
Smoked, ribbed sheets, lb..... .62
Para:
Up River, fine, lb. .68
Up River, coarse, lb. ..... .40
Island, fine, lb.... .59
Island, coarse, lb. .27
Caucho, ball, upper, lb. ..... .40
Caucho ball, lower, lb. ..... .36
Shellac (orange), gal. .70-.76
Spelter ..... .04½
Steel:
Angle beams and channels, lb. .... .03
Automobile sheet (see sp. table).
Cold rolled, lb..... .06½
Hot rolled, lb..... .03½
Tin ..... .94-.95
Tungsten, lb. 2.40
Waste (cotton), lb... .12¾-.17

AUTOMOBILE SHEET PRICES

(Based on No. 22 Gage. Other gages at usual differentials)

	Primes only. Per 100 lb.	Primes when seconds up to 15 per cent are taken. Per 100 lb.	Seconds arising.
Automobile body stock	$5.95	$5.85	*See Note
Automobile body stock, deep stamping	6.20	6.10	
Automobile body stock, extra deep stamping	6.45	6.35	
Hood, flat fender, door and apron, or splash guard stock	6.05	5.95	
Crown fender, cowl and radiator casing, deep stamping	6.30	6.20	
Crown fender, cowl and radiator casing, extra deep stamping	6.55	6.45	

Automobile Sheet Extras for Extreme Widths:
Nos. 17 and 18 over 36 in. to 44 in., 10c. per 100 lb.
Nos. 19 to 21 over 36 in. to 44 in., 30c. per 100 lb.
Nos. 22 to 24 over 26 in. to 40 in., 40c. per 100 lb.
Nos. 22 to 24 over 40 in. to 44 in., 80c. per 100 lb.
Black sheet extras to apply to narrow widths.
Oiling, 10c. per 100 lb.
Patent leveling, 25c. per 100 lb.
Resquaring, 5 per cent of gage price after quality, finish and size extras have been added.

*Ten per cent less than the invoice Pittsburgh price for corresponding primes.

Automotive Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge
*Ajax Rubber Co.	63	64	—23½
*J. I. Case T. M. Co., pfd.	80	86	..
Chalmers Motor Co.,, com.	3¾	5	—1
Chalmers Motor Co., pfd.	25	35	..
*Chandler Motor Co.	81	83	+1
Chevrolet Motor Co.	136	138	+4
*Fisher Body Corp., com.	35	45	+5
*Fisher Body Corp., pfd.	82	87	—2
Fisk Rubber Co., com.	55	58	..
Fisk Rubber Co., 1st pfd.	98	102	..
Fisk Rubber Co., 2nd pfd.	78	83	—20
Firestone Tire & Rubber Co., com.	89	91	..
Firestone Tire & Rubber Co., pfd.	93	95	..
*General Motors Co., com.	157	160	+3
*General Motors Co., pfd.	81⅞	82	..
*B. F. Goodrich Co., com.	44½	45	— ¼
*B. F. Goodrich Co., pfd.	97¼	100	—1
Goodyear Tire & Rubber Co., com.	166	169	—1
Goodyear Tire & Rubber Co., pfd.	97	97½	—1½
Grant Motor Car Corp.	2¾	3	— ½
Hupp Motor Car Corp., com.	3	3½	+ ½
Hupp Motor Car Corp., pfd.	78	80½	— ½
Intenational Motor Co., com.	29	35	..
International Motor Co., 1st pfd.	55	65	..
International Motor Co., 2nd pfd.	35	43	+3
*Kelly-Springfield Tire Co., com.	49	50	—1
*Kelly-Springfield Tire Co., 1st pfd.	79	87	..
*Lee Rubber & Tire Corp.	18	20	..
*Maxwell Motor Co., Inc., com.	31	31¼	+3
*Maxwell Motor Co., Inc., 1st pfd.	57	58	..
*Maxwell Motor Co., Inc., 2nd pfd.	21¼	22	+1
Miller Rubber Co., com.	103	105	+4
Miller Rubber Co., pfd.	92	95	+3
Packard Motor Car Co., com.	117	120	..
Packard Motor Car Co., pfd.	93	96	..
Paige-Detroit Motor Car Co.	18	20	..
Peerless Truck & Motor Corp.	14	16	..
Portage Rubber Co., com.	102	105	+3
Reo Motor Car Co.	13	15	..
*Saxon Motor Car Corp.	8½	9	+ ½
Standard Motor Construction Co.	11½	12½	—1½
*Stewart-Warner Speed. Corp.	57½	58½	..
*Studebaker Corp., com.	46¼	47	+ ½
*Studebaker Corp., pfd.	85	90	..
Swinehart Tire & Rubber Co.	55	62	—3
United Motors Corp.	33¼	34	—1
*U. S. Rubber Co., com.	59⅞	60⅛	+1⅛
*U. S. Rubber Co., pfd.	104¼	106¼	+1¼
*White Motor Co.	41	42	..
*Willys-Overland Co., com.	20	20½	..
*Willys-Overland Co., pfd.	81½	83	..

*At close July 6. Listed N. Y. Stock Exchange.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	Bid	Asked	Net Ch'ge
Auto Body Co.	..	..	..
Bower Roller Bearing Co.	16¼	..	..
Chevrolet Motor Co.	..	135	..
Commerce Motor Co.	..	..	..
Continental Motor Car Co., com.	5¼	5½	+ ¼
Continental Motor Car Co., pfd.	92¾	..	..
Edmunds & Jones; com.	14	14	..
Edmunds & Jones, pfd.	80	80	..
Ford Motor Co. of Canada	178	..	..
Hall Lamp Co.	..	..	..
Michigan Stamping Co., com.	12¾	12¾	..
Motor Products	..	..	..
Packard Motor Car Co., com.	113	120	+7
Packard Motor Car Co., pfd.	93¾	93	+ ¼
Paige-Detroit Motor Car Co.	19	..	..
Prudden Wheel Co.	..	..	..
Reo Motor Car Co.	13½	13⅝	+ ⅛

Scientific Tests for Headlamps

New York Develops Laboratory Method and Will Certify Anti-Glare Devices

NEW YORK CITY, July 10—A sane effort has been made by Secretary of State Francis H. Hugo of New York, to test headlights for the purpose of determining whether they should be classed as glaring or not. Instead of a state evolving its own scheme, Secretary Hugo has for some months been working with a special committee of the Society of Automotive Engineers and another committee from the Society of Illuminating Engineers. A long line of laboratory experimentation has been carried on, and the result is that glare is to be tested according to the strength of the light at a distance of 100 and 200 ft. in front of the car.

While all of the experimental work was conducted in the laboratory it will be possible with a foot-candle meter to make tests on darkened streets of any city. The entire scope of the law is based on tests with such instruments. This is the first time in which a scientific method of tests has been developed, and one in which the personal equation is almost entirely eliminated.

The New York State law which makes compulsory the elimination of glare provides also for the testing of headlamps by the Secretary of State. The Secretary of State, following a conference between makers of glare eliminating devices and representatives of the S. A. E. and the Society of Illuminating Engineers, has laid down the following specifications to which devices must conform to be acceptable:

1—The candlepower must be at least 1200 at a distance of 200 ft. in front of the car and at a point between the roadway and 42 in. above it.

2—The candlepower must not exceed 2400 at a distance of 100 ft. in front of the car and at a point 60 in. (or any higher) above the road.

3—The candlepower must not exceed 800 at a distance of 100 ft. in front and 7 ft. to the left of the center of the car at a point 60 in. above the road.

According to the provisions of the New York State law, a manufacturer of headlamp glare eliminating devices may submit samples to the Secretary of State for testing. These will be tested according to a standard method and with instruments which are standard and have been developed for this specific purpose. If the devices conform to the specifications previously mentioned a certificate to that effect will be given the manufacturer. If the devices cannot be made to conform to the specifications using the standard bulbs prescribed by the specifications but are O.K. with bulbs of another candlepower, the device may be passed with corresponding limitations.

Any manufacturer of glare eliminating devices may submit samples of his product to the Secretary of State for testing. The law provides a fee of $50, payable to the Secretary of State, for the work.

Following is the complete text of "Specifications for Headlight Tests":

SPECIFICATIONS FOR HEADLIGHT TESTS

General Conditions of Acceptability

For the purpose of test the intent of the New York State law dealing with automoile headlights and providing that front lights shall be so arranged, adjusted and operated as to avoid dangerous glare or dazzle, and so that no dangerous or dazzling light, projected to the left of the axis of the vehicle when measured 75 feet or more ahead of the lamps, shall rise above 42 inches on the level surface on which the vehicle stands, such front lights shall be sufficient to reveal any person, vehicle or substantial object on the road straight ahead of such motor vehicle for a distance of at least 200 feet, is deemed to be complied with if the following conditions are fulfilled:

1. Any pair of head lamps under the conditions of use must produce light which, when measured on a level surface on which the vehicle stands at a distance of 200 feet directly in front of the car and at some point between the said level surface and a point 42 inches above this surface, is not less than 1200 apparent candlepower.

2. Any pair of head lamps under the conditions of use shall produce light which, when measured at a distance of 100 feet directly in front of the car, and at a height of 60 inches above the level surface, on which the vehicle stands, does not exceed 2400 apparent candlepower, nor shall this value be exceeded at a greater height than sixty inches.

3. Any pair of head lamps under the conditions of use shall produce a light which, when measured at a distance of 100 feet ahead of the car, and 7 feet or more to the left of the axis of same, and at a height of 60 inches or more above the level surface, on which the vehicle stands, does not exceed 800 apparent candlepower.

Conditions of Laboratory Test

In order to determine whether any particular device conforms to these requirements, it shall be subjected to laboratory tests according to the following specifications:

Number of Samples

Two pairs of samples of the device submitted shall be subjected to test. In the case of front glasses, the sample shall be of 9¼ inch diameter, when practicable.

Reflectors and Incandescent Lamps

The reflectors used in connection with the laboratory tests shall be of standard high-grade manufacture of 1.25 inch focal length, with clean and highly polished surfaces and as nearly truly paraboloidal in form as practicable, and as approved for this purpose by the National Bureau of Standards.

The incandescent lamps used in connection with the laboratory test shall be of standard high-grade manufacture and as approved for this purpose by the National Bureau of Standards.

Adjustments by Manufacturers' Representative

The manufacturer of the device shall be given due notice of the date and place of test. Manufacturers' representatives present at the test shall be privileged to adjust their devices in any way which represents an ordinary and legitimate adjustment, including tilting the lamps or reflectors, which can be carried out by purchasers of the device, or such adjustment may be made by the laboratory expert acting on the instructions of the manufacturer. The character of the adjustments so made shall be carefully noted and stated in the report as manufacturer's adjustment.

Tests

The tests shall be as follows:

Test 1. Four-point test of pairs of samples.

A pair of testing reflectors, mounted similarly to the head lamps on a car, shall be set up in a dark room at a distance of not less than 60 feet nor more than 100 feet from a vertical white screen. If a testing distance of 100 feet is taken, the reflectors shall be set 28 inches apart from center to center, and if a shorter testing distance is taken, the distance between reflectors shall be proportionately reduced. The axis of the lamps shall be parallel and horizontal, or as tilted in accordance with manufacturer's adjustment. The intensity of the combined light shall then be measured with each pair of samples in turn, with the reflectors fitted with a pair of each of the following types of incandescent lamps, in turn.

(1) Vacuum type, 6-8 volts, 17 mscp., G-12 bulb.

(2) Gas-filled type, 6-8 volts, 20 mscp., G-12 bulb.

The lamps shall be adjusted to give their rated candlepower. Measurements shall be made at the following points at the surface of the screen:

A In the median vertical plane parallel to the lamp axes, on a level with the lamps.

B In the same plane one degree of arc below the level of the lamps.

C In the same plane one degree of arc above the level of the lamps.

D Four degrees of arc to the left of this plane and one degree of arc above the level.

In an acceptable device both pairs of samples shall conform to the following specifications for observed apparent candlepower.

Points A and B. At least one of these points the apparent candlepower shall not be less than 1200.

Point C. The apparent candlepower shall not exceed 2400.

Point D. The apparent candlepower shall not exceed 800.

Provided, however, that if the test indicates that a device which is unacceptable with either of the test lamps will come within the specifications with lamps of another candlepower or of the other type, the device may be passed with corresponding limitations as to the incandescent lamps to be used in connection with it. Test 2. Complete test of single sample.

A single sample taken as an average representative of the device as manufactured, shall be submitted to a complete test with a vacuum incandescent lamp of 17 candlepower, 6-8 volt rating in a G-12 bulb. This test shall show its light distribution characteristic by actual measurements made according to recognized and exact methods.

Distribution of Samples

One pair of the samples submitted shall be retained by the testing laboratory for purpose of future reference and as sample of construction, and the other pair shall be returned to the office of the Secretary of State.

Report

The report of the tests shall be rendered in duplicate to the Secretary of State, and shall be signed or initialed not only by the expert making the test, but also by an executive officer of the institution making the test.

It shall include a statement by the testing laboratory as to whether the device when properly applied substantially complied with Section 286 of the Highway Law and shall suggest the maximum candlepower to be used with the same, and as to the other conditions necessary in the operation of the device, in such a way that it will comply with the requirements of this specification.

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Distribution of Truck Weights

(*Continued from page* 48)

faster vehicle. Of course, quality of steel used also is a very important factor, but it would be difficult to say whether alloy steel springs are more used in large trucks than in small trucks.

Propeller shaft proportional weights are not affected by load capacity. The average value for this part is 1.45 per cent. Many of the larger trucks have double propeller shafts, and both of these, as well as the universal joints in the transmission line, are included in this figure.

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First American-Built Handley-Page Bombing Plane Launched

(*Continued from page* 46)

produced in the whole year of 1915."

And on the Liberty engine, the present director of airplane building placed an uncompromising endorsement which has much weight coming from a man of Mr. Ryan's well known conservatism and capacity for getting at facts.

General Engineer Depot Contracts

WASHINGTON, June 28—The following awards have been made by the General Engineer Depot, United States Army:

June 19, 1918

Champion Spark Plug Co., Toledo, Ohio; spark plugs.

Duff Mfg. Co., Pittsburgh, Pa.; automobile jacks.

June 20, 1918

Penberthy Injector Co., Detroit; valves and injectors.

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Medical Contract for Prest-O-Lite

WASHINGTON, June 26—A contract has been issued by the Surgeon-General of the Army to the Prest-O-Lite Co., Indianapolis, Ind., for laboratory apparatus.

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Ordnance Contracts Awarded

WASHINGTON, June 28—The Ordnance Department has placed contracts with the following companies:

Nash Motors Co., Kenosha.
Four Wheel Drive Auto Co., Clintonville, Wis.
Russel Motor Car Co., Buffalo.
Willard Storage Battery Co., Cleveland.
Chicago Pneumatic Tool Co., New York.
Timken Detroit Axle Co., Detroit.
Detroit Steel Castings Co., Detroit.
Commerce Motor Car Co., Detroit.
Dodge Brothers, Detroit.
Aluminum Casting Co., New York.
Packard Motor Car Co., Detroit.
Pyrene Mfg. Co., New York.
The White Co., Cleveland.
Wilson Body Co., Detroit.
Holt Mfg. Co., Peoria, Ill.
Motor Trucks (Ltd.), Brantford, Ontario.
The Miller Rubber Co., Akron.
Willard Machine Tool Co., Cincinnati.
Four Wheel Drive Auto Co., Clintonville, Wis.
The Nash Motors Co., Kenosha.
Columbia Steel & Shafting Co., Pittsburgh.
Moline Pressed Steel Co., Moline.
Simplex Tool Co., Woonsocket.
North & Judd Mfg. Co., New Britain.
Olympian Motors Co., Pontiac.
Greenfield Tap & Die Corp., Greenfield, Mass.
Aluminum Co. of America, Pittsburgh
Ford Motor Co., Philadelphia.
Hugh Lyons Co., Lansing.
Van Dorn Iron Works, Cleveland.
West Steel Casting Co., Cleveland.
Logansport Castings Co., Logansport, Ind.
McKinnon Chain Co., Buffalo.
Nash Motors Co., Kenosha.
Eisemann Magneto Co., Brooklyn, N. Y.

Contracts

International Harvester Co. of New Jersey, Chicago.
C. I. Best Gas Traction Co., Dayton.
American Automobile Accessories Co., Cincinnati.
Maxwell Motor Co., Dayton.

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WASHINGTON, July 3—The Surgeon-General of the Army has approved the following contracts:

Plymouth Rubber Co., Canton, Mass., rubberized fabric.
Tyer Rubber Co., Andover, Mass., surgical equipment.
U. S. Rubber Co., New York, basins.

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WASHINGTON, July 3—The Bureau of Supplies and Accounts of the Navy has placed the following contracts:

Wayne Oil Tank & Pump Co., Fort Wayne, tanks.
Packard Motor Car Co., Detroit, trucks.
Detroit Forgings Co., Detroit, forgings.
Rome Brass & Copper Co., Rome, N. Y., rods, sheets, tubes.
Wayne Oil Tank & Pump Co., Fort Wayne, measuring pumps.
Ford Motor Co., Detroit, twelve Ford cars.
Becker Milling Machine Co., Hyde Park, Mass., milling machinery.

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WASHINGTON, July 3—The Willys-Overland Co., Toledo, Ohio, has a contract with the Ordnance Department for the manufacture of 2927 75-millimeter guns and carriages, according to a letter from Major-General Crozier, Chief of Ordnance, to Senator J. W. Weeks, published in the Congressional Record.

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WASHINGTON, July 3—The General Engineer Depot of the War Department has placed the following contracts:

The Acme Rubber Co., Trenton, fire hose.
Arcadia Trailer Corp., Newark, spare parts for trailers.
Goodyear Tire & Rubber Co., Philadelphia, steam hose.
Goodyear Tire & Rubber Co., Dayton, nozzles for fire hose.
Splitdorf Electric Co., Newark, electric parts.
Westinghouse Co., Schenectady, engine parts.

Navy Contract Awards

WASHINGTON, July 5—The Bureau of Supplies and Accounts of the Navy Department has placed the following contracts:

Lawrence Bros. Co., South Gardiner, Me., airplane spruce.
Morse & Buffman Co., Providence, airplane spruce.
Van Blerck Motor Co., Washington, gas engines.

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WASHINGTON, July 6—The General Engineer Depot, War Department, has placed the following contracts:

Hendee Mfg. Co., Springfield, bicycle and motorcycle tools.
Arcadia Trailer Corp., Newark, N. J., tire-press trailers.
Detroit-Trailer Co., Detroit, reversible trailers.
Highway Trailer Co., Edgerton, Wis., reversible trailers.
Thermoid Rubber Co., Trenton, hydraulic compressed brake lining.

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WASHINGTON, June 29—The General Engineer Depot of the War Department has let contracts as follows:

Acme Road Machinery Co., Frankfort, Ky., portable stone bins.
American Road Machinery Co., Philadelphia, Pa., portable bins.
Goodyear Tire & Rubber Co., Akron, airplane fabric.
August Zimmermann, Washington, speedometers.

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Reo Speedwagons for Canadian Service

LANSING, MICH., July 6—The Reo Motor Car Co. will deliver under contract to the Canadian Government 185 Reo speedwagons, eighty-five of which will be used for ambulance purposes. For ambulance work the government buys only the chassis, fitting on its own especially made ambulance bodies. The remaining part of the contract will be used for general transportation purposes in hospital work. The speedwagon ambulances will transport wounded men from the transports to hospitals in the interior. The delivery of the Reo speedwagons will make a total of 400 such vehicles in government service in the Dominion.

Calendar

RACING

July 27 — Chicago. Chicago Speedway.
Aug. 3—Uniontown. Uniontown Speedway Assn.
Aug. 10—Providence, R. I.
Aug. 17—Sheepshead Bay.
Sept. 2—Uniontown. Uniontown Speedway Assn.
Sept. 7 — Chicago. Chicago Speedway.
Sept. 21—Sheepshead Bay.
Oct. 5 — Cincinnati. Cincinnati Speedway.

SHOWS

July 29-Aug. 4—Salina, Kan. National Tractor Demonstration. Auspices of National Implement and Vehicle Assn.
Sept. 14-21—Chicago. Automotive and Accessories War Exposition. Municipal Pier.
Oct. 14-27—Dallas, Tex. Seventh Annual Texas Automobile Show. Texas State Fair.
Oct. 16-18—Ottawa, Ont., International Plowing Match, Tractor and Farm Machinery Demonstration. Experimental Farm.

ENGINEERING

Sept. 2—Cripple Creek, Colo. American Institute of Mining Engineers.
Nov. 14-15—New York. Society of Naval Architects and Marine Engineers. Twenty-sixth general meeting. Engineering Societies Bldg., 29 West 39th Street.